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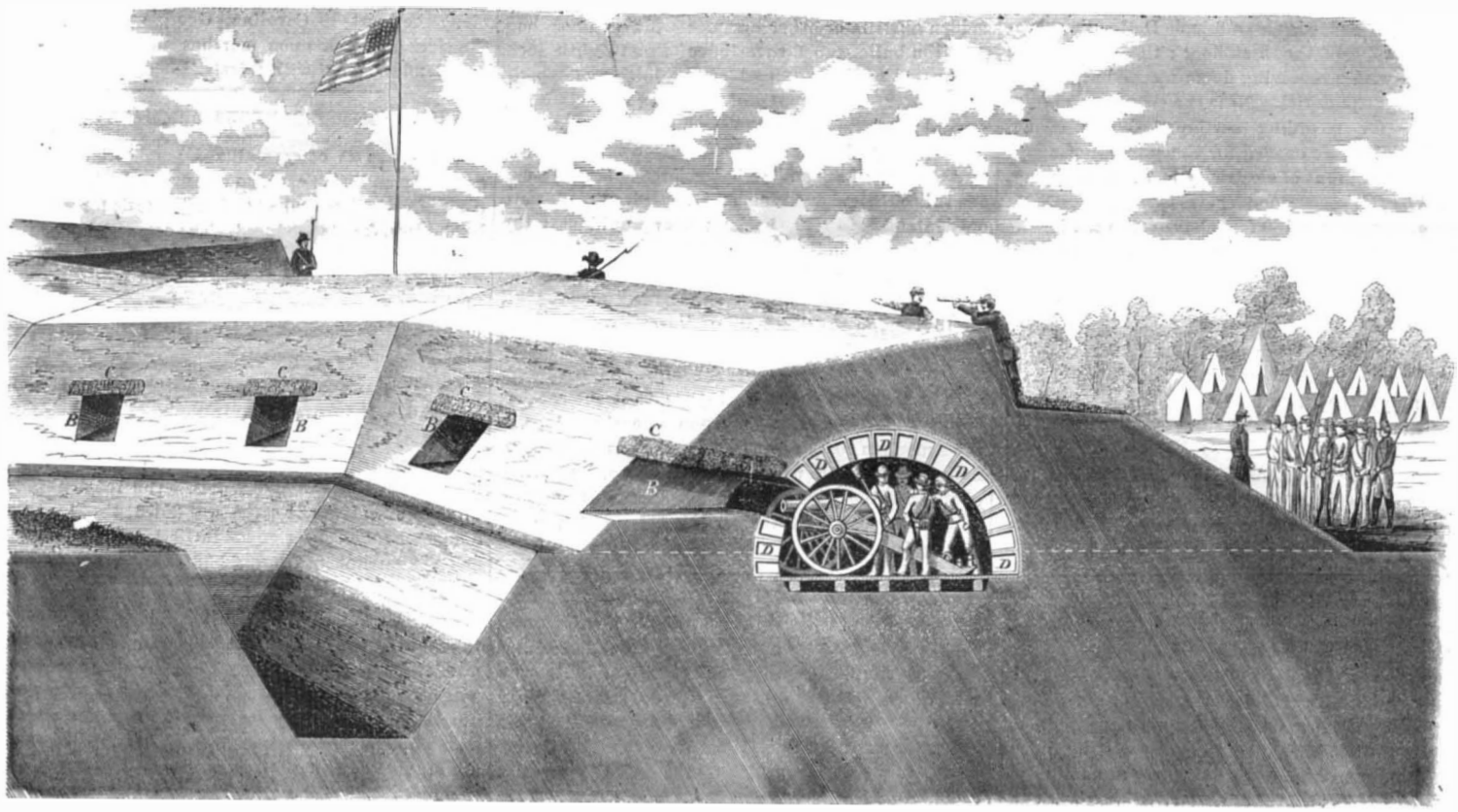
Improved Field Fortification.

The siege of Charleston is an instance of a fact before observed in the memorable siege of Sebastopol: one which promises to work an important change in defensive military operations. This is the superior power of resistance evinced by earthworks over forts constructed of masonry. It will be remembered that in the Crimean campaign, the genius of Todtleben devised a system of earthworks which resisted several bombardments from hundreds of guns, and were only captured by assault after a heroic defense of nearly a year. The siege of Sebastopol proved that little would be gained by firing horizontally against earthen entrenchments, other than dismounting guns, to which the besiegers are equally liable. The stone works at Bomarsund, like our brick Fort Pulaski, withstood for a few hours only, the accuracy of modern artillery and the tremendous power of modern projectiles. The events at Charleston are so recent that it will be necessary only to allude to the fact that Sumter soon became a mass of ruins before a fire, terrible indeed, but one which Fort Wagner—a sandwork of little pretension, at one-third the distance of Sumter—was able to defy for days; suffering no more damage than could be repaired in a few hours.

The earthwork, however, possesses no method of protection for its guns and garrison, such as is afforded by the casemates of stone and brick forts. The soldiers in the former class of works are exposed to curved fires, and a vigorous shelling has often made an earthwork untenable, when otherwise as strong as ever. How to supply this deficiency, and give to the earthwork this additional protection to its defenders and power against assailants, has been one of the great questions of military engineering. Various proposed modifications have been rejected, as requiring too much time for their construction. The above engraving represents the plan of M. Pierre Jamain, of Bordeaux, France, which is claimed to be a solution of the question. By means of an arch, A, he secures a continuous casemate running under the parapet. Openings, B, are made at proper intervals for embrasures, which are formed in the usual manner by fascines, C, gabions or sandbags. The arch is composed of hollow wooden voussoirs, D (nineteen to the arch) and is at least thirteen feet in width. These voussoirs are so constructed as to fold up, and may be easily carried on the knapsack: though this part of the invention would be unnecessary in applying it to works thrown up for the defense of large towns, where material is convenient and abundant; but for intrenched camps, or armies at a distance from their base, the additional portability of the voussoirs thus obtained would be important. A work thrown up on this plan differs in none of its proportions from those now constructed. The trace of the work having been marked out by the engineer, a trench one foot in depth, is dug twenty feet in the rear of the line of the main ditch which gives additional hight to the casemate: the arch is then thrown up over this trench, omitting one or more voussoirs at the places designated for embrasures; the main ditch is commenced, the earth from it being thrown upon the arch, and the parapet is finished precisely as in other works, excepting, of course, the completion of the embrasures. The guns mounted in these casemates, in addition to their use at ordinary times, would be of especial service at the most critical moment of the assault, viz., when the assaulting forces had approached so near that the fire from the top of the parapet would pass over their heads, and, by sinking the arch near the dead angles, a command of the ditch would be obtained with none of the objections urged against the use of caponnieres. The inventor says (in a communication to us on that subject):—"Many of our seaboard towns feel alarmed in view of the dangers to which they will be exposed in case of foreign war; and, indeed, auxiliaries to our few forts are requisite to effect that security which Russia had not time to perfect, and hence lost a city, a fleet and dockyards. The time, material, skilled workmanship and expense needed to erect works of masonry put them out of the question, even if they possessed the same merits that earthworks do. Should we be enabled to combine the economy, ease of construction and powers of resistance of earthworks with the protecting powers of masonry, the advantages will be incalculable."



JAMAIN AND TRIPPE'S FIELD FORTIFICATION.

A patent for this invention was obtained through the Scientific American Patent Agency, on Oct. 6, 1863, by Messrs. Jamain & Trippe. Further information can be had by addressing James M. Trippe, Orange, N. J.

Naval Observatories.

New York is the largest city and greatest commercial port on the continent of America, and should have the first position in every enterprise of a scientific character relating to navigation. It is to be regretted that she has hitherto occupied a most inferior position in all that relates to mathematical and astronomical science as applied thereto. For example, it is well known that an observatory is a practical and important institution for navigators, and New York merchants have talked from time to time of erecting one; but hitherto it has amounted to talk only. It was proposed to erect one in the Central

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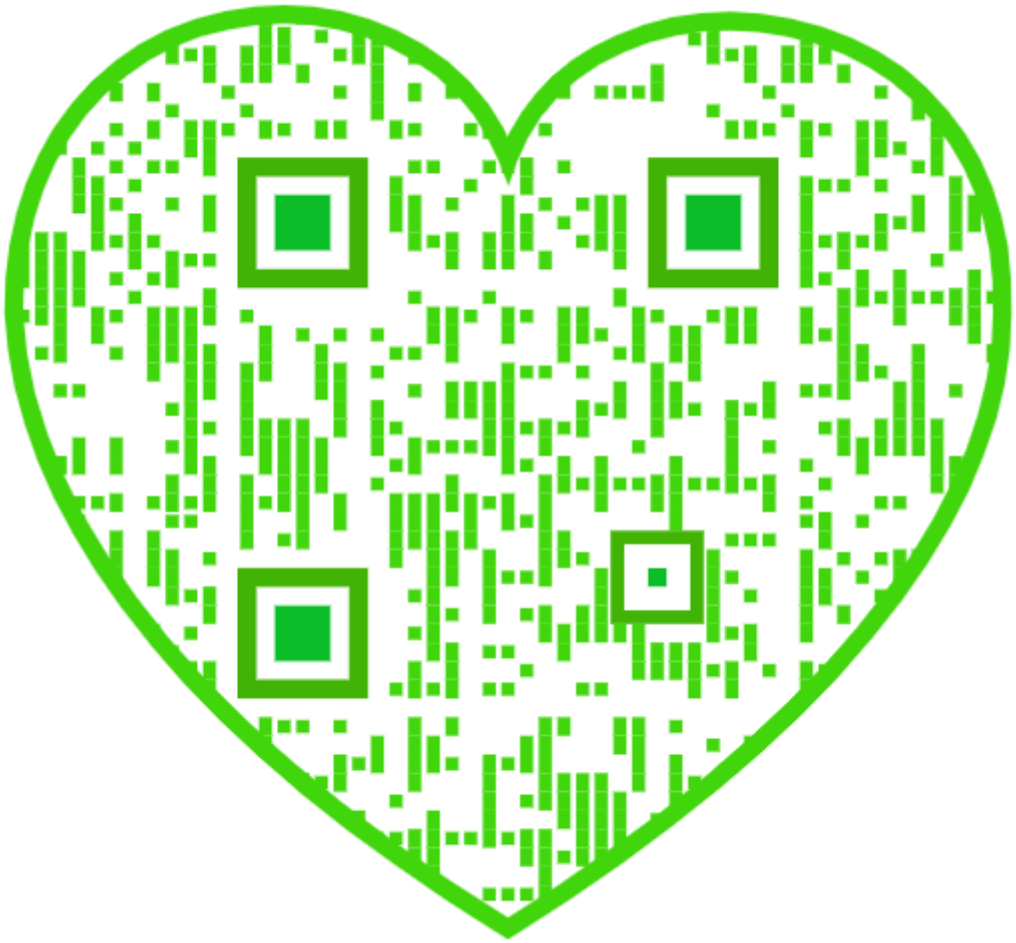

Park, and several years ago, a memorial on this subject was presented to the Chamber of Commerce, of this city, which was referred to a committee, and there it seems to have slept ever since. The city of Albany has surpassed New York in scientific enterprise; for it has erected and endowed an excellent observatory, and Montreal, C. E., has lately shown us a creditable example. The following is a brief description of the observatory and furnishings there, which will be interesting to all nautical men :—

The principal room is on the first floor, and contains a small library of books used for the different calculations, also barometers, thermometers, globes, a telegraph apparatus in connection with the fire alarm telegraph—for the purpose of furnishing correct time to the city: a single touch of the key causing all the church bells to strike at the hour of noon ; also a quadrant and artificial horizon.

Transit Room.—Which is in an unfinished state, contains a transit instrument, chronometer, star maps all used, and a nautical almanac for correcting the chronometer to mean solar time.

Basement.—In this room more particularly, as also in the general construction of the building, iron has been carefully excluded. It is destined for magnetic observations, containing a dip circle (the one used during the magnetic survey of Great Britain), a declinator and instruments for vibration, and horizontal and total force; besides a small library of books for the calculations, also a barometer, hygrometer and standard thermometer.

On the flat roof are rain gages, dry and wet ball thermometers, solar and terrestrial radiators, evaporator, and apparatus for experiments on ozone ; also a telescope for observing the sun's spots—possessing a large field. There is also a 3-inch Dolland's achromatic telescope on the first floor; the transit room is finished with a revolving dome for the purpose of receiving an equatorial. Near the entrance is an instrument for recording earthquake phenomena. There is also a pole erected for the purpose of ascertaining the amount of electricity in the atmosphere, and a Whewell's anemometer.

The observatory is 180 feet above mean sea level.

The observatory is destined only for meteorological and magnetic observations ; the only astronomical observations will be the transit of stars, solar spots and eclipses.

Strictly speaking it is really a Nautical Observatory: just such an institution as New York should have had many years ago.

A City in the Rocky Mountains.

The resident population of Virginia, Nevada Territory, on the 1st of July was estimated at fifteen thousand, the daily average number of transient visitors being as many more. Main street, which is the Broadway and Wall of that city, to some three quarters of a mile in length, is crowded with people of every grade and description ; a large proportion being elegantly dressed males and females.

The buildings on Main street are mostly brick; the first story iron, open in front. This gives a light, cheerful appearance to the street, especially in the night time when brilliantly lighted with gas. Many of the buildings in this city are provided with vaults and salamanders ; all the four and five-story brick and iron front fire-proof buildings now going up have one or both of these indispensable features. Some of the streets are so blocked up with lumber, brick and mortar, that teams are at times unable to get along ; common laborers get from $4 to $5 a day, without board. The city supports four daily newspapers, a theatre, opera-house, several churches, and any number of melodeons and negro minstrels ; to say nothing of the institutions already enumerated above.

No one who has been here can form an idea of the amount of treasure to be seen in passing through Main street. At Wells & Fargo's banking house and express office it is not uncommon to see tuns of "silver bricks" wheeled in and out in the course of an hour. These "bricks," in shape resemble the ordinary fire-brick, but are much larger, and from nine hundred and eighty-five to nine hundred and ninety per cent fineness ; which is ten to fifteen per cent less than pure silver—averaging some eighteen hundred dollars each. The sight drafts sold frequently amount to a hundred thousand dollars a day. Sums of twenty dollars and upwards are usually paid in twenty dollar pieces. No paper currency there, or in any of the mining towns west of the Rocky Mountains—Salt Lake City being the only place where paper circulates for money. So much for a city less than six years old.

Locomotives on the Military Road at Alexandria.

The *Herald* says:—There are sixty engines belonging to the road—forty-five new ones and fifteen old ones. The new ones have all been built since the commencement of the war, and are the best engines of the class that ever were built: weighing from thirty-five to forty tuns each, and ten thousand dollars their average cost. Their names are decidedly military, having among them Mars and Hercules ; and after these mythological fighters, the names of several of our leading generals. It was amusing to hear the different remarks and orders about the engines—as for instance:—

"What are you going to do with General Hooker?"
"Put on a new blower."
"How is General Burnside ?"
"A screw loose."
"Where is General Couch ?"
"Played out."
"How is the J. H. Devereux ?"
"Always ready."

I noticed among the engines the Secretary, which, it will be remembered, on the 26th of August was fired into at Bristow and Catlett's Station. Indentures made by the rebel bullets are still visible in its jacket. This is the crack engine for speed on the road.

At one time there were serious thoughts of making all the engines iron-clad, to insure protection against sudden guerilla or other assaults. Six engines had this iron bullet-proof covering of three-eighth inch thickness, and were used as the initiative experiment. For the purpose of resisting assault they worked admirably ; but the confined air, heat, and impossibility of escape to the engineer and his assistants in case of the engine being forced off the track, has led to their abandonment. These iron-clads were only intended to resist bullets: they would stay the progress of a shell no better than so much brown paper. I observed in the house the iron-clad engine introduced in Baltimore after the attack made April 19, 1861, upon the Sixth Massachusetts regiment.

The Sea Swallowing up the Land.

It is well known to geologists that the sea has been gradually encroaching upon several portions of the American coast ; but its advance has been most noticed on certain parts of New Jersey. A correspondent of the New York *Evening Post*, writing from Cape May, gives some interesting information upon this subject from which we extract as follows:—

"On the west side of Cape May, at a point where the shore is most boldly outlined, the solid gravel bank, from twelve to eighteen feet high, wears away about one foot a year ; the foundations of the houses built at the first settlement, as early as 1691, were long since undermined, and the waters of the bay now cover the place where they once stood. At this cape, the most southerly point of the New Jersey coast, the encroachment of the tides is equally rapid, a full mile having been washed away since the Revolution. During that period, according to the report of the State Geological Survey, a militia artillery company had its practicing ground here. Their gun was placed near a house which stood just aside of the present shore line, and their target was set up three-quarters of a mile east. This last point was at the outer edge of the cultivated ground, between which and the water's edge there were sand hills or beaches a quarter of a mile in extent. The whole of this is now gone ; and one of the hotels has twice been moved inland, on account of the constant advance of the tide.

"Old observers upon the Atlantic and Bay shores all agree as to the gradual advance of the ocean upon the uplands. Narrow fringes of wood which formerly skirted the marshes have been killed by the salt water, and numerous islands—spaces of land found surrounded by salt marsh—which, within the memory of men now living, have been cultivated, and others which were in woods, have been entirely lost in the advancing marsh, and their location is only to be known by the shallowness of the mud which covers them. In all the salt marshes on this shore, stumps of trees, of the common species of the country, are found with the roots still fast in the solid ground at the bottom of the marsh, and this at depths far below low-water mark. Similar submerged forests, it may be incidentally remarked, are observed on the Massachusetts and other coasts.

"The period during which this subsidence has been in progress cannot be estimated with any degree of accuracy. From the best evidence that can be gathered, it would seem to be certain that two feet in a hundred years is not above the rate at which the shore is now sinking. These changes on the New Jersey coast do not appear to be confined to the more southern shore. The same thing has been observed in the salt marshes on the Raritan, and at the mouths of the Hackensack and Passaic rivers.

"Mr. Lyell, in his work on the Principles of Geology, says:—'Recent observations have disclosed to us the wonderful fact, that not only the west coast of South America, but also other large areas, some of them seven thousand miles in circumference, such as Scandinavia and certain archipelagoes in the Pacific, are slowly and insensibly rising ; while other regions, such as Greenland, and parts of the Pacific and Indian oceans, in which atolls or circular coral islands abound, are as gradually sinking.' Professor Hitchcock, in his Report on the Geology of Massachusetts, mentions the same phenomena as exhibited there. Mr. Lyell, in his First Visit to America, speaking of the coast of Georgia, says:—'I even suspect that this coast is now sinking down at a slow and insensible rate, for the sea is encroaching and gaining at many points on the fresh-water marshes.' Bartram, the botanist, writing in 1792, testified that along the coasts of Carolina, Georgia, and Florida, the tides encroach upon marshes which were once high land, covered with forests."

MISCELLANEOUS SUMMARY.

Mix one part of crystallized perchloride of iron gradually and with care, so as not to boil, with six parts of collodion, and a good hæmastatic for wounds, leech-bites, &c., is produced. The composition should be of a yellowish red : it is perfectly limpid, and produces a yellow and very elastic pellicle. This hint to surgeons comes from Antwerp ; it might be useful also to men who shave either themselves or others.

Co operative societies are multiplying rapidly in England. These are organizations of working-men who estabiish stores or manufactories wherein all engaged are partners. A report says that there are 332 such in England and Wales. The total number of shares held (at £1 each) was 351,612. The total amount expended for goods in 1861 was £2,067,867 and the amount of sales £2,331,650, leaving a net profit of £165,770.

The "Great Eastern."—It is currently reported, that the *Great Eastern* will be laid up in England for the present. The company require more capital or they will be obliged to suspend altogether. The owners of the great ship seem to be in the condition of the man who won the elephant in a raffle ; they have no use for the ship, can't sell her, or yet run her, and her final destity is a problem that time alone will solve.

From some unexplained cause there has been immense leakage of petroleum from the warehouses at Rotterdam—the river and canals are covered with it, the walls are impregnated, and the people hardly dare carry lights for fear of involving the town in a general conflagration.

M. Brice, "the giant of the Vosges Mountains," is visiting Edinburgh. He is 8 feet high, 4 feet 6 round the chest, wears a ring presented to him by the Emperor, which is three times as large as ordinary rings, and sleeps on a bed 9 feet 6 inches long.

A Pomerania grazier saved his cattle from a contagious typhus fever, then very destructive, by inoculating them with the saliva of an animal laboring under the disease. The incision was nearly an inch in length, on the inner side of the thigh.

A German agriculturist says that before he plants his potatoes he washes them in chlorine water, and dries them in the sun. He says that this has saved them from potato disease during several years.

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AMERICAN AUTOMATA.—The St. Paul (Minn.) *Pioneer* says that a gentleman of that city has produced, after three and a-half years of close application, some of the most wonderful automata the world has ever seen. They consist of six figures, full size of life, three of each sex, dressed in the fashion, and so closely resembling living persons as to deceive all but the closest observers. These figures appear on the stage each with a harperion (whatever that may be), and at a sign given by the leader, they salute the audience and commence playing. They perform a large number of melodies, keeping perfect time and producing full harmony.

CURIOSITY OF THE VISION.—It has been found, while firing at the running man-target at Wimbledon, England, which is scarlet on one side and grey on the other, that the scarlet dazzles the eye, and is hence the most difficult to hit, from leaving a red streak behind it, which unsettles the aim. The grey side was struck seventy-four times, and the red only forty-two times. It is a curious fact, too, that men with grey eyes shoot better than those with eyes of other colors.

QUICK WORK.—A firm of biscuit manufacturers in Carlisle, England, by way of showing what could be done by rapid work, recently had a field of wheat reaped, the grain thrashed and ground, and the flour made into biscuits, which were served hot on the breakfast table at eight o'clock, in exactly four hours from the time the sickle was first put into the standing grain.

[A little energy is all that John Bull needs to transform him into a first-class Yankee. That same thing has been done in this country long ago.—EDS.

The work on the iron-clad steamer *Monadnock*, now building at the Charlestown, Mass., Navy Yard, is going on rapidly, but will not be so far advanced as to admit of launching for several days. A part of the plating has been put on, and her boilers are also on board and will be put in proper position immediately.

A BERLIN professor finds that Europe contains 72,000,000 inhabitants, Asia 720,000,000, Africa 89,000,000, America 200,000,000, and Polynesia 2,000,000—total, 1,283,000,000. Of this little crowd, about 32,000,000 die in each year, which is 87,761 a day, or 61 per minute. Another professor calculates that 36,627,843,275,075,855 people have lived on the earth since the creation.

A GREAT many English blockade-runners are now in this port overhauling and refitting, preparatory to being placed on the blockade. The old proverb, "Set a thief to catch a thief," seems specially applicable to this case.

A GOOD cement for the joints of steam pipes is made with 6 parts (by weight) of plumbago, 3 of slacked lime, and 8 of the sulphate of baryta, mixed with boiled linseed oil.

QUANTITIES of straw hats are annually made at Foxborough, Mass. We are informed that the value of the trade in this place amounts to many thousands of dollars annually.

THE British barque *Glenista* arrived at this port last week, with 7845 packages of tea from Japan. This is the second cargo of Japan tea that has arrived at New York.

ALONG Oil Creek, Pennsylvania, there are 150 steam engines and 70 refineries; and it is reported not a foundery or machine-shop more convenient than Erie or Pittsburgh.

THE longest and oldest chain bridge in the world is said to be at Kingtung in China, where it forms a perfect road from the top of one lofty mountain to the top of another.

A LARGE number of steam engines, from ten to forty horse power each, are now used in the Treasury building in the manufacture of paper currency, bonds, notes, &c.

TEN HOUR SYSTEM.—Nearly all the mill-owners in Paterson, N. J., have acceded to the ten hour arrangement, and work in the factories has recommenced.

THE Illinois State Fair, which closed on the 3d instant, was a marked success, the receipts amounting o $12,000.

A time ball was for a while dropped at Liverpool by electricity at Greenwich. It was given up because the distance was too great to ensure regularity. The same result followed the attempt to drop the time ball on the old Custom-house in this city, by a current from the Dudley Observatory at Albany. Time guns are getting into favor in lieu of time balls. Three guns are discharged in various parts of Scotland at 12 M., from the Observatory at Edinburgh.

AN exchange says:—"There is considerable excitement just now in business circles connected with the Lake Superior trade, in consequence of the discovery of an immense deposit of silver-bearing lead in that famous region. It is stated that the ore yields twenty per cent of pure lead, and that every tun of lead yields twenty-five pounds of silver."

THE gold market in New York has been unsettled during the past week, but sales have been pretty heavy at 147 per cent. The fluctuations in gold and exchange have unsettled values of both domestic and imported merchandise, and served to greatly retard business in many articles.

BY late news from San Francisco, vessels for export cargoes were very scarce. Desirable charters were offered for carrying grain to England, and lumber, wool, barley, hides, &c., to Boston and New York.

THE shipbuilders of New York were never so busy as at the present moment, both in the construction of new and the repairing of old vessels.

THE Portuguese Government has built a gun-boat. It has one gun. It is named *The Terror of the Sea.*

TIDES have recently been remarked in the Lakes of Geneva and Neufchatel—cause not known.

THE Reading Railroad people are building a locomotive weighing fifty-five tuns.

Mr. GEORGE PEABODY has presented Yale College with a geological cabinet worth $125,000.

The Gun Panic in England.

The *Saturday Review* says:—"On the question of the best mode of constructing heavy artillery, it is possible that we may also have something to learn from the Americans. All the experiments tried in this country have pointed at one broad conclusion—that the penetrating power of a shot depends mainly on the charge of powder, and that it makes comparatively little difference whether the powder is utilized by impressing a very high velocity on a moderate-sized bolt, or a lower speed upon such masses of metal as are hurled from the Dahlgren guns. The shot, after all, is only a means of carrying the force of the powder from the cannon's mouth to the target; and it is not surprising that the resulting effect should depend more on the amount of the original impulse than on the means employed for its transmission. Still, there must be certain proportions between the charge and the shot which will produce the greatest effect; and upon this point English and American views have long been divergent. Our artillerists have thought more of increasing velocity, while the Americans have attached the greatest importance to the bulk of the cannon ball. It may deserve consideration whether (especially for long-range firing) the Americans have not come nearer than ourselves to the best model. While practical trials are being so freely made across the Atlantic, it would be folly absolutely to commit ourselves finally to any plan, either of ship-building or gun-building, until the full benefit of foreign experience has been reaped; but the Admiralty cannot be too strongly urged to lose no time in perfecting their own experimental ships and guns, and putting the navy in a position to deal satisfactorily with the most powerful vessel that any foreign country can produce."

The Wealth, Power and Crime of London.

The city of London now covers an area of one hundred and twenty square miles, and contains a population of about three million souls. It is stated in a late report of the Registrar-General that its population has increased, since 1860, at the rate of one thousand per week. It far surpasses any other city on the face of the earth in wealth, and, alas—it must also be added—in human misery also. The Registrar-General records the lamentable fact that one in six of those who leave the world die in the public institutions—workhouses, hospitals, asylums or prisons. Nearly one in eleven of the deaths is in the workhouse. Every sixth person dies a pauper or a criminal! And how great a number who barely manage to escape this fate. The severe competition for subsistence and wealth which characterizes London life is a terrible ordeal for any human being to pass through.

Cities are centers of great temptations, in which many persons sink every year from wealth to poverty, by a love of display beyond their incomes. Others again are tempted still deeper, and forsake the paths of virtue for those of vice. It is related that of the 8,000 convicts in institutions near London 1,000 were born in affluence, and had received a classical education. Allured by the vices of gambling in attending sportive scenes, they squandered their patrimony; and being tempted, committed crime, thus sinking to the degraded condition of felons. London has always been an alluring city to provincial youth. Goldsmith, declared that in his day thousands died there yearly from broken hearts, stricken by poverty; and to-day similar scenes are witnessed and like sorrows experienced to an extent unimagined by the sensitive poet.

The Proper Depth of Under-draining.

Sanford Howard, Esq., of the Boston *Cultivator*, who has spent much time among the best farmers of England, alludes to a remark in the London *Farmer's Magazine* in regard to a "dogmatism of drainage" among some English writers on the subject, and remarks that we, on this side of the Atlantic, are not strangers to this same kind of dogmatism. It has been asserted here, as in England, that a drain should always be at least four feet deep. "The attention of these dogmatists," says Mr. Howard, "has been called to the fact that, on certain lands in this country, drains of two and a half to three feet deep have doubled the crop of wheat, raising it from fifteen to thirty bushels per acre, on the average, for several years; and in reference to this fact the question has been asked whether there was any evidence that in these cases the benefit would have been greater from deeper drains, or whether the increased benefit from four-feet drains would have compensated for the increased expense. No responses were made to these questions, but the persons to whom they were addressed go on with their dictation, without even alluding to the demonstrated benefits of drains of less depth than their creed recognizes. "Occasionally the attempt has been made to show that four feet drains are not really any more expensive than those of two and a half feet, because it was asserted that the spaces between the drains could be doubled. The defenders of this assumption were told that experience had clearly proved that in stiff clay soils this rule was fallacious; that the deep drains would not sufficiently draw the water through the wider spaces. This fact seems now to be generally admitted by British teachers, though some of their American pupils have not yet found it out." Mr. Howard cites several instances to prove that the four-foot rule is not applicable to all cases.

John Johnston, the pioneer of draining in New York, says:—"If practicable, drains should go so deep that the water may come in at the sides, instead of rising from the bottom of the ditch; and this I have found to be the case at from 2½ to 3 feet deep, on my farm. After going deep enough to protect the tile—and 2½ feet is ample for that—I can see no reason for getting down 18 inches into the hard-pan or stiff clay, wherein there is no water, neither do I think any man can show a good reason for so doing."

The New Flying Machine.

On page 195 of the present volume, we published a paragraph in reference to Dr. Andrews' Flying Machine, which the inventor states did him injustice. In this respect we have to say that such a course was very far from our intention; we have no desire to misrepresent any invention, and we based our remarks upon public information derived from the columns of a contemporary. Dr. Andrews has since called on and shown us letters from a Justice of the Peace in his neighborhood, and also from other persons, which state that the machine turned in the air with great facility, &c., and that they consider it a success. With such evidence in its favor we must believe that the machine accomplished all that the inventor claims for it, and we hope at no distant day to have a ride in the new aerial car.

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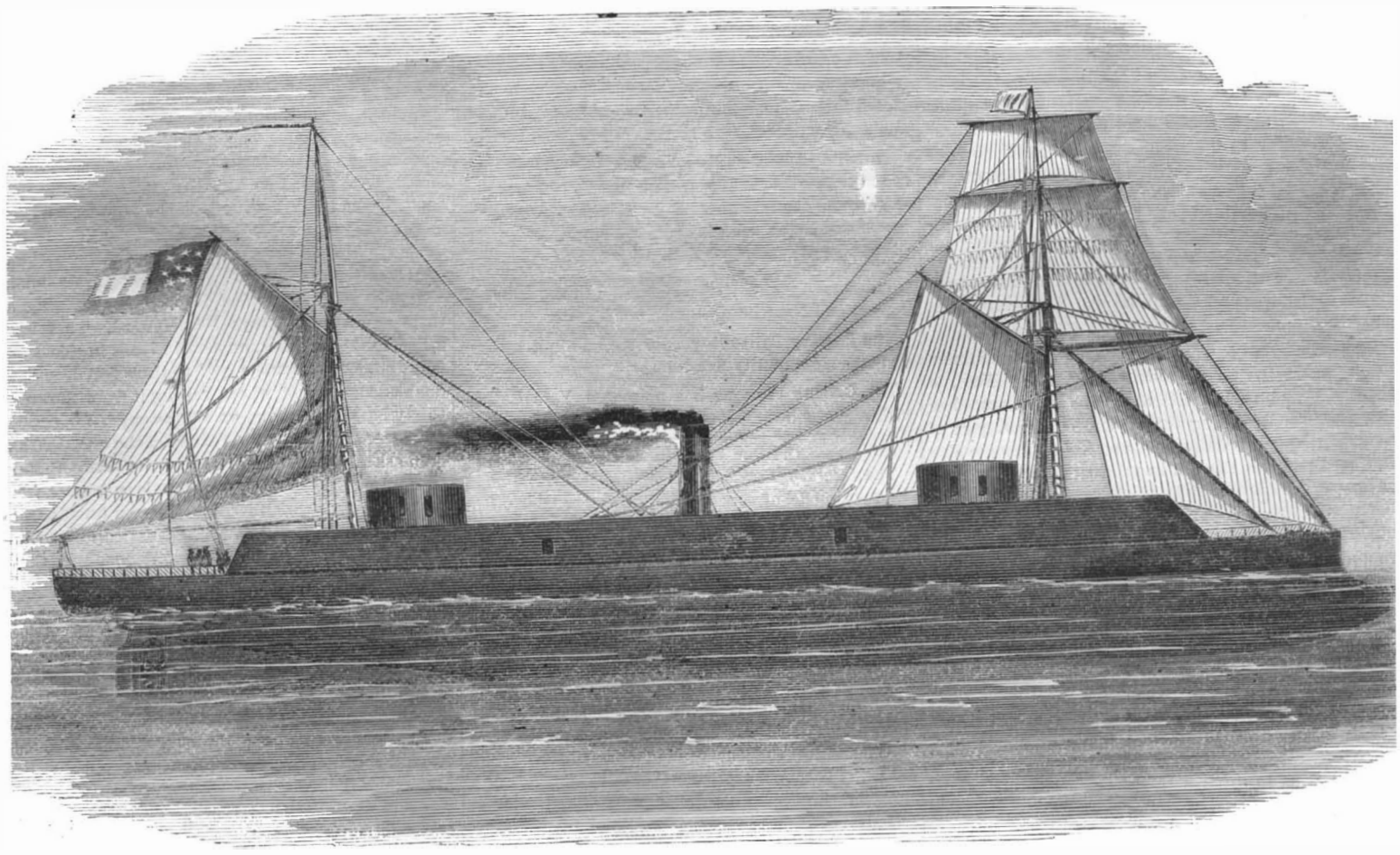
Rebel Steam Ram Building on the Clyde, Scotland.

We are enabled to lay before our readers this week an illustration of one of the rebel rams, building on the Clyde, Scotland. They combine the casemated and turret principles of defense, with what advantage remains to be seen. This much, however, may be said in criticism without danger of false prophesying:—If the casemate is strong enough to resist shot at short range, then the turrets are of no use, except to contain two additional guns, which might have been carried with more advantage on the main deck. If the casemates are not invulnerable then the turret machinery is as likely to be smashed and rendered inoperative as a steam boiler would be. If the casemates are impervious at long range then the turrets are unnecessary, and are dead weight that should have been omitted, while at close quarters the casemates may be riddled and the turrets still withstand the impact of shot. We think one good thing at a time is sufficient; casemates and turrets are both useful in their place; but the rebel ram annexed is very like a warrior with a brazen helmet, which protects his head while his body is uncovered. This vessel was drawn by an American gentleman in England, and the following description is copied from the *Providence Journal*:—

"In company with an intelligent and experienced shipmaster we crossed 'Tranmere Ferry,' and arrived at the yard at 10½ A. M. The ram on the stocks was of the same dimensions as the one previously. In length about 250 feet, 40 feet beam, and 20 feet depth of hold, as near as could be judged by the eye. The stem is of rolled iron, about 6 or 8 inches thick and 12 or 15 wide. The bottom is flat, with a slight keel, and the screw as usual, but protected in the conformation of the stern. The ram is a projection of solid iron, of the same thickness as the stem, and from 6 to 8 feet beyond this perpendicular line, resembling more nearly in form an inverted nose. When the vessel floats this formidable appendage is below the water-line and invisible. As the clock struck eleven the last block was 'knocked from under,' and the vessel moved steadily and gracefully into the water. The English ensign was flying from a spar at the stern-post, and as the hull left the shed the French colors were raised at the stem. The masts are tubular, and the top masts intended to be inclosed as a spy-glass. The fore-castle and poop-deck are of boiler-iron, and are calculated and arranged for being shot away in action.

"The bulwarks are hung with heavy strap hinges, intended to be lowered in action, so as to give clean flush decks, and to facilitate the boarding of an adversary. There are two turrets or towers, about 20 feet in diameter and 10 in hight. They are placed partly above and below decks; are pierced for two guns each, entered below decks through six man-holes; they are built of very heavy boiler-iron on the outside and inside, and to be filled in with a foot thickness of wood or some more resisting material. They revolve on twenty-four wheels (similar to the small wheels of a locomotive radiating from a center), on axles of wrought-iron to the circle of the diameter of the turrets. The top of the turrets (and deck) is protected by thick iron. One of them is in the rear of the foremast, the other of the main mast. Between the forward turret and smoke-funnel is the pilot-house, of an octagonal form (if as the model of wood in place), pierced with small sight-holes, and overlooking the turrets. What the arrangement may be for directing the movements of the vessel was not ascertained, as no one except workmen were allowed on board, and the small size of the pilot-house would hardly admit of a wheel on it. Each vessel has a powerful engine of between 300 and 400 horse-power. The hull of the ram nearest completion is first of heavy iron 1 inch in thickness, then a planking of teak wood 9 inches, and an outer covering of iron plating of 4½ inches thickness. But so well-finished is this work that there is no indication of the thickness or strength visible. The tunnage of each must be nearly two thousand tuns, and the armament for the turrets was not the only ordnance to be carried on deck. These vessels are of so peculiar a model and construction that I expressed confidently the opinion that under no subterfuge of reasoning or pretext could they be allowed to depart on their intended mission of destruction. The French and English colors were at masthead on this latter vessel also. It was stated that they were for the French Government, but a card from the French Consul denied the rumor. Afterward it was announced that the funds for their construction were furnished by M. Sangier, a French banker, who has a mortgage upon both vessels. The objection that they are unseaworthy seems futile, as the weight of the turrets and machinery is principally below decks Such an objection certainly was not expressed by my very intelligent companion."



THE ANGLO-REBEL RAMS.

To Detect Plaster of Paris in Flour.

If it is suspected that flour contains plaster of Paris, it may be detected as follows:—

"Take twenty-five grains of the flour, and burn in a porcelain crucible; remove the black cinder and powder, ignite again for fifteen minutes; when cold boil the black powder thus obtained in nitric acid for a few minutes, when the lime is converted into nitrate. It seems that a portion of the black powder is oxidised by the acid, which itself is reduced to the state of nitric oxide, which in contact with the air is converted into red fumes of nitrous acid; when cold add a little water and filter; evaporate the filtrate with gentle heat to dryness. A crystallin deliquescent salt of nitrate of lime will be obtained, which is perfectly soluble in water, alcohol, and alcoholic ammonia; dissolve either in water or alcoholic ammonia. The solution has a strong acid reaction; filter if necessary, then add ammonia to neutralize the acid, then oxalic acid, when a white flocculent precipitate is immediately produced, soluble in hydrochloric acid or nitric acid; wash the precipitate and treat it with acetic acid, filter, wash with warm water until free from acid. Heat the white precipitate of oxalate of lime thus obtained, in a glass tube sealed at one end, to redness, when the oxalate will be converted into carbonate without any discernible discoloration, from which, by weighing, the quantity of lime present can be deduced. This last test is worthy of notice, inasmuch as it is easy of manipulation and exceedingly delicate; so much so that lime may be detected when only in the proportion of one grain to the 100 grains of flour."

THE next transit of Venus will take place in 1874, and the next afterward in 1882. There will be great preparations to take observations in all parts of the world, and it is expected that the sun will be found to be four million miles nearer to the earth than was supposed.

A PINT of milk is said to be a remedy for poisoning by eating muscles. Stimulants are to be taken an hour after the milk.

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AMERICAN AND ENGLISH CAST-IRON GUNS.

Although both England and France have done much toward the introduction of heavy ordnance into their forts and navies, the goddess of peace has hitherto prevented us from practically testing the capabilities of guns intended to throw shot, ten or twenty of which would make up a tun.

Hitherto we have been unsuccessful in the introduction of any guns throwing shot much exceeding 100 pounds weight. This arises from a misapprehension of the mission which very heavy ordnance is calculated to fulfill; from a faulty principle of construction following as a consequence; from defective materials, and imperfections in the mode of formation. In all these respects our practice differs materially from that of the Americans. We attach little or no value even to a 200-pound gun if it be not rifled. The moment we obtain a smooth-bore of the kind, it is sent to the shops to be rifled—destroyed in consequence—pronounced a failure, and all large guns included in a sweeping condemnation. Our American friends, on the contrary, are content with the smooth-bore, well knowing that sharp rifling, heavy shot, and sufficient powder to attain a long range, are incompatible in the present state of the iron manufacture: hence their papers teem with reports, the truth of which we see no reason to doubt, of the performance of 150-pound and 200-pound guns, spoken of, too, with a familiarity which shows that their use is, if not universal, at least general. It will be urged that the monitors are armed with heavy rifled guns as well as smooth-bores; but we must remember that the American rifling is very different from ours—in fact, the system of grooving applied to most of their heavy cannon would scarcely be considered to deserve the name here, so slow is the twist.

It is extremely erroneous to conclude that all these guns are made of wrought-iron. Even without the positive evidence on the subject placed at our command, we have the negative information, derived from our own failures, to prove that the manufacture of heavy guns from wrought-iron is uncertain in the extreme. The American forges are certainly superior in no way to ours, in dealing with large masses of iron; and the Ordnance Department of the United States was so well impressed—as far back as the year 1841—with the importance of perfecting the manufacture of cast-iron guns, that able officers were appointed to every cannon foundery under contract with the Government, to conduct experiments, and see that all the resources of science and art were employed to produce the best possible ordnance. Some brands of American cast-iron are infinitely superior to anything we can produce here. Inspection has increased the average strength of cast-iron cannon from 23,638 pounds to 37,774 pounds of transverse strain per square inch of section. The principle of re-melting is largely carried out, in some experiments the transverse strength of the iron having doubled by four meltings. This principle, combined with a careful admixture of different samples, and the exposure of the melted iron to a very intense heat for considerable periods, is found so far to improve its quality, that a sample was obtained at the Greenwood Foundery, New York, the density of which was 7·304, and its tensile strength 45,970 pounds! When we state that our best irons seldom exceed half this—23,000 pounds being a high average—we are in a position to understand why cast-iron ordnance succeeds better in America than in Great Britain. Bronze guns are little used, except for the smallest pieces, its great expense and the uncertainty of the quality produced condemning it for heavy ordnance. Major Wade's experiments in 1850 showed a difference in the density of various samples, taken from the same gun, equal to 20 pounds to the cubic foot, the variation in tenacity being as 100 is to 236. A large proportion of the cast-iron ordnance is constructed on the "Rodman" principle. Two 8-inch guns, cast the one hollow the other solid, were discharged repeatedly. The one cast solid burst at the 73d fire, while the other withstood 1,500 rounds, and was pronounced practically indestructible with service charges. We have already stated that the heaviest guns used in the American Navy are, as a rule, either smooth-bores, or, if rifled, the grooves have an extremely moderate twist; the general principle of construction being to impart just such a velocity of rotation, and no more, to an elongated projectile, as will secure it from turning over in its flight. When the shot is made short in proportion to its diameter, very little suffices for this, and the gun is thus saved from the strain due to sharp rifling. The range is maintained with a smaller quantity of powder, and the accuracy of flight is preserved sufficiently for practical purposes. Range is imperially affected by the resistance of the atmosphere. The resisting surface area of the Armstrong shot is to the 68-pound spherical projectile as 10 is to 50, while the expansive range of the powder is nearly 24 to 15. These are the conditions which secure range; to which rifling is really, in the abstract, inimical. Were it possible to discharge a conical shot, with a length of four or five diameters, from a smooth-bore, its range would be nearly double that of the Armstrong gun; and though this is to a certain extent impracticable, there is nothing, probably, to prevent the construction of a 100-pound gun, which would pierce the *Warrior's* side at 1,200 yards, with a charge which even a good cast-iron gun might sustain many hundreds of times without injury. It would only be necessary to use a shot two or three diameters long, fitted so accurately as practically to prevent windage, while five or six grooves, making perhaps one-tenth of a turn in the length of the gun, would secure the end on flight of the projectile.

We strain every nerve to supply our ships with arms of precision, forgetting that the conditions essential to the proper exercise of their powers can never be secured at sea. The officers on board the *Excellent*, when experimenting on rifled guns by firing at a fixed mark, found "that there being no wind, and the tide keeping the vessel steady, they were sure of hitting it. Immediately the wind was a little too strong for the tide, and the vessel moved about, there was a considerable difference in the precision of the firing, although the water was as smooth as glass." Smooth seas and balmy breezes are rather the exception at sea, and neither Whitworth nor Armstrong would stand much chance of hitting a vessel even a mile off in a gale.

The 68-pounder is considered defective, because it wants range and accuracy. In smashing power it stands pre-eminent. The wisest course is to impart the advantages of a modified system of rifling to an arm which we cannot really dispense with; such guns would thus be rendered capable of discharging conical projectiles much higher, and better calculated for long flights than spherical 68-pound shot, without any considerable sacrifice of initial velocity. Iron plates 4½ inches thick would prove a poor defense at even 1,000 yards from such ordnance.

The principal strain on the material composing a gun is indirectly due to the force required to overcome the *vis inertia* of the projectile. The power required to start a heavy shot into rapid motion, in a space of time inappreciably small, is something enormous, and would seem to imperatively dictate a recourse to some expedient which will put the shot gradually in motion; several have been resorted to. In America, Eaton's gun has proved very successful. This gun, which is of considerable length, is loaded with a cartridge filled with an extremely slow-burning powder next the shot, the rest of the charge is made up of the quickest powder which can be obtained. The charge is ignited in front, thereby starting the shot into motion. A 6-pounder, at 5 degrees elevation, has thrown its shot 2,457 yards; at 10 degrees, 4,000 yards; at 2 degrees, 1,100 yards.

The armament of our Navy becomes, if possible, of more importance day by day. Ship guns will now have to perform work such as they never had to perform before. Field artillery requires little change. The same work has to be performed by it now which it accomplished fifty or one hundred years ago. It will have to be done at greater ranges, that is all. If we draw the proper distinction between the services, we shall at once see the folly of sacrificing weight of shot and penetrative power to the attainment of a precision of fire, which, for its proper development, absolutely demands a fixed basis. In guns of great size, grooved just enough to secure the leisurely rotation of shot carefully made, and so fitted that windage is impossible, will be found the real weapon for the Navy. We have evidence before our eyes of the actual performance of such guns on the American continent. The lesson is too valuable to be suffered to slip from us unimproved. We search in vain for the record of any ordnance experiments which decide the minimum amount of twist requisite to secure the proper rotative velocity of a projectile. We believe the day is not far distant when such knowledge will be invaluable, for on it depends in a great degree the success of all large guns. Without elongated shot we cannot have range or penetration at distances. Without rifling, we cannot use elongated shot. The heaviest ordnance has hitherto failed when rifled; and in the reconciliation of these apparent incompatibilities, will be found the most serious problem which the science of gunnery ever presented. We believe its solution lies in so modifying the rifled system, that the communication of a moderate rate of rotation may no longer increase the resistance to the motion of a projectile through the bore of a gun, to such an excessive degree as to lead to its immediate or ultimate destruction.—*Mechanic's Magazine.*

SCIENTIFIC INFORMATION—BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Scientific Balloon Ascents.—Mr. Glaisher read a paper on this exciting topic. He said:—"On ascending with a cloudy sky, the temperature usually declines till the clouds are reached, but on breaking through them there is always an increase of several degrees; and after this the decline of temperature usually continues, and would do so continuously if there were no disturbing causes in operation. It is necessary in considering the law of the decrease of temperature, to take into account the state of the sky, and to separate the experiments made in one state from those in the other. The results in the cloudy state do not at all confirm the theory of a decline of 1 degree of temperature in 300 feet. If we now consider the decrease at hights above the cloud plane, and the decrease of the temperature of the air at hights exceeding 5,000 feet, the results follow almost in sequence with those found with a partially clear sky and show that an average change takes place of 1 degree of temperature in 139 feet near the earth, and that for a change of 1 degree at the hight of 30,000 feet we have to pass through at least 1,000 feet. If we now take the whole decrease of temperature with elevation, we shall have the following results:—From the ground to 1,000 feet, 7 degrees, or 1 degree in 139 feet. At about 14,000 feet, the average is as 1 degree in 300 feet; but at hights less and greater than 14,000 feet the space is less or greater than 300 feet. It is certain, then, that in any balloon ascent between 8,000 feet and 20,000 feet, if the temperature on leaving the earth and at the highest elevation were only used, the results, 1 degree in 254 feet in the former, and 1 degree in 355 feet in the latter, would have been looked upon as generally confirming the theory of a decline of 1 degree in 300 feet.

"In some cases of quite clear sky the decline of temperature in the first 100 feet exceeded 1 degree. The decline of temperature in cloudy states of the sky near the earth is only one-half of that when the sky is clear. From these we may conclude that the decline of temperature is largest near the earth, smallest at the highest elevations, and intermediate with increasing spaces. From all the experiments made it was found that at the earth's surface there were upon the average very nearly five grains of water in a cubic foot of air, in the invisible shape of vapor, or 1-50th part of a cubic inch of water. This value decreased gradually to one-half at the hight of 5,000 feet, where there was only 1–100th of an inch of water in a cubic foot of air. At the hight of 10,000 feet this amount was reduced to less than 1½ grains; at 15,000 feet high there was only 6-10ths of a grain, or 1-280th part of a cubic inch? at 20,–000 feet this was reduced to half a grain; and at 25,000 feet to 1-10 only of a grain, or to a mere drop of water, 1-2,530th part of a cubic inch, being 1-50th part only of the water at the surface of the earth. But the actual amount met with on any ascent will most probably differ from these results, as, like the temperature of the air, the diffusion of water seems to be very rarely in a normal state.

"On the 31st of March the sky was of a deep Prussian blue, and on the 18th of April it was of a faint blue only. Sir Isaac Newton cubic

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ers this color as a 'blue of the first order.' Professor Clausius considers the vapors to be vesicles or bladders, and ascribes the blue color of the first order to reflection from the thin pellicle of water. In reference to these opinions the following facts are important :—1. The azure color of the sky, though resembling the blue of the first order, when the sky is viewed from the earth's surface, becomes, as observed by Mr. Glaisher in his balloon ascents, an exceedingly deep Prussian blue, as we ascend to the hight of five or six miles, which is a deep blue of the second or third order. 2. The *maximum* polarizing angle of the atmosphere being 45 degrees is that of air, and not that of water, which is 55 degrees. 3. At the greatest hight to which Mr. Glaisher ascended—namely, five, six, and seven miles, where the blue is the brightest, 'the air is almost deprived of moisture.' Hence it follows that the exceedingly deep Prussian blue cannot be produced by vesicles of water, but must be caused by reflection from the molecules of air, whose polarizing angle is 45 degrees. The faint blue which the sky exhibits at the earth's surface, is therefore not the blue of the first order, and is merely the blue of the second or third order, rendered paler by the light reflected from the aqueous vapor in the lower regions of the atmosphere."

Professor Owen said he had attended this meeting of the section chiefly in the hope of hearing from Mr. Glaisher something of the influences of these very high distances on the human frame, which was adapted, of course, to a very different medium. The fact which had been mentioned of Mr. Glaisher as to his feeling a greater power of resisting the influence of very high temperatures, was very interesting in physiology. They knew their lungs did adapt themselves to atmospheres of different degrees of gravity, so that there were people who lived habitually on high mountains, and felt no difficulty in breathing, such as was felt at once when the inhabitant of a plain or low country came up to these elevations. Now that depended upon the greater proportion of the minute cells of the lungs which are open and receive an attenuated atmosphere, in proportion to the minute cells that are occupied by a quantity of mucus. Those on the plain did not make so large a use of their breathing apparatus as those who lived at great altitudes. Hence more cells, occupied by mucus, would be taken up, and opened to free course and play; and he had no doubt that was the solution of the interesting fact mentioned by Mr. Glaisher. Physiologists were all agreed that one condition of longevity was the capacity of the chest, and therefore he hoped the increased breathing capacity acquired by Messrs. Glaisher and Coxwell in their balloon ascents would tend to the prolongation of their lives.

Corrugated Armor-plates.—The following is the substance of a paper read upon this subject by George Bedford :—"The principle of protecting ships by thick plates of iron against projectiles of steel or homogeneous iron, hardened and tempered, would appear to be erroneous, for the following reasons, namely, that iron plates must always be softer than the projectile, while the latter has an almost unlimited advantage in the force which can be given to it by strengthening guns so as to bear very large charges, and thus gain increase of velocity with increased weight of shot. Still more is this the case if flat-headed projectiles, hardened and tempered as the Whitworth shell and shot, are to be provided against. The method which I propose is founded upon two principles of strength—cohesive strength and mechanical strength. The plates being made of steel, hardened and tempered as nearly as possible up to the cohesive strength of the Whitworth shot and shell, are of two kinds—one thick and corrugated, the other thinner and plain. The steel corrugated plates, which are three inches thick, are placed upon the thinner plates of one inch, also tempered, and bolted through the skin of the ship to the ribs in the iron ship, or to the timbers in a wooden one. If iron plates of the corrugated form were backed with an inch plate of steel, hardened and tempered, they would, I think, prove impenetrable; and even smooth iron plates of 4 inches thus laid upon steel would be more effective than iron plates, even of 7 inches thick, backed by timber. In explaining the mode in which I conceive this kind of compound armor plattes of act, it is necessary to consider to what the great force of flat-headed projectiles is due. It will be admitted that this is not to be attributed to the velocity of the shot, but to its flat form and great cohesive strength; because spherical and conical projectiles sent with higher velocity do not pierce iron plates. The rationale of the punching action may not yet be quite clearly understood, but this much seems to be established, that a flat-headed shot pierces because its whole force is applied equally in one direction, and free from the lateral resistance which the conical and round shot meets with. I venture also to state that the suddenness of the impact of such a body has much to do with the effect; it would seem that time is an important element in the consideration, and therefore if this perfect impact can be delayed, and still more, if it can be prevented altogether, the piercing of the plate will not be effected. As an illustration of the difference between force applied with time and force without it, may be pointed out the simple experiment of striking an anvil with a small hammer, and placing the same force in weight gradually, or with time. In the first case the force is not conducted away into the mass of the anvil, but is spent in repelling the hammer, and possibly in breaking it into fragments. This is also exemplified in the smashing of round shot against an iron target of proper thickness. In the case of the hammer being pressed upon the anvil, no effect is produced upon either the one or the other. Another familiar illustration is in the effect of soft materials, such as gun wads or tallow candle, being sent at high velocity through wooden planks, and, as frequently occurred, killing persons struck by them. Velocity, then, may be described as force with the least possible element of time; the best example, perhaps, of which is electric force in the form of lightning. The analogue of this force is seen in the flash of flame which occurs when a shot strikes at high velocity upon an iron plate. Now, the object of the steel plates being hardened and tempered, is to delay the shot by its cohesive strength, and to prevent, by the corrugated surface, the whole area of the flathead projectile bearing upon the plate at the same moment of impact. The shot is delayed partly by this means, and partly by meeting with a metal as hard and tough as itself, and thus time is allowed for the conduction of the force away into the surrounding metal without fracture and penetration; the objects which I consider most important being, first to prevent penetration of the outer plate, and to oppose a shot which did pierce it, when it has expended its force, by covering the skin of the ship with a thin steel plate, in preference to increasing the thickness of the outer plating. The mechanical strength of this arrangement of plates consists in the double arch form combined with a certain amount of 'play' and elasticity, obtained by fixing the corrugated plate upon a flat one. The flat action of the projectile is also prevented by, as it were, converting it into a round head or a hollow head before it reaches the inner plate. The space between the corrugations being about four and a half inches, a flat-head shot of five inches diameter would begin to bear upon less than one square inch of plate if it struck across a furrow, while if it struck upon a corrugation, the surface pressed upon, even with a seven-inch shot, would be seven square inches instead of thirty-nine, which is the area of impact of a shot of this diameter upon a flat surface. In a large proportion of hits the shot would have to cut through in an oblique direction about six inches of metal before reaching the plain plate. The advantages of the plan proposed are, besides the protection of the ships, the reduction of the weight of armor much below that contemplated for the new ships of war. The saving of at least one inch in thickness of plates would give a reduction of 100 tuns; and if it should be found that timber backing can with this armor be dispensed with—a point now so much the subject of inquiry—the reduction of weight would be about 250 tuns in a ship of the *Warrior* class. The extra cost would be to a great extent met by the saving in the thickness of plates and the timber backing. I look to the development of the working of steel, and the conversion of iron into that far stronger metal, for the acquisition of a lighter and impregnable armor for ships of war: a desideratum which can never be attained by merely increasing the thickness of iron to any extent a ship could carry and be fit for ocean service. As to the manufacture of such plates as I have described, I have the authority of the most eminent makers of steel, that steel plates of this kind could be manufactured at about one-third more than the cost of the best iron armor-plates.

Steamship Performance.—A committee has been in existence for several years, which was appointed by the Association to obtain information respecting the performance of steamships, so as to obtain scientific and reliable data respecting their models, engines, &c., in order to arrive at reliable conclusions as to the best forms and machinery. This committee, through the Duke of Sutherland, Chairman, reported at the meeting of the Association; and the following portion of the report will show what a leaden-headed set the Lords of the Admiralty are. It says :—

"One of the chief objects in the appointment of this committee was to induce the Lords of the Admiralty to take the steps necessary to obtain such exact scientific data as should serve for the determination of the true principles to be used in the design and construction of steam fleets. For this purpose exact observations are necessary to be made with fitting instruments, specially constructed, upon steamships of large size, in smooth water and rough, laden and light, towing and being towed, going slow and going quick, with clean bottoms and with foul, under predetermined varieties of condition. Such exact experiments are essential to the promotion of the science of naval construction, and can only be made by the naval service of the country, for whose special benefit they are designed. The British Association has freely, for many years, expended its own funds for this great national purpose, and it only applied to the Admiralty when their own exertions could not accomplish anything further without aid. The committee report, with deep regret, that all their exertions, repeated year by year, have failed to move their lordships to collect a systematic series of scientific data of this sort, either for the use of their own officers, who ardently desire such professional information, or for the use of science at large; the only objection they state being that such knowledge would cost money, and that they do not think fit to authorize the necessary expenditure. The committee have, therefore, to report that this portion of their mission has entirely failed, and they think they could render no service to science by any further communication with the Admiralty on a matter which seems hopeless."

Clarifying Wine.

After grape must has undergone its first or great fermentation, and is barreled and stored away, a second or slow fermentation usually takes place, and is allowed to continue up to a certain point, which differs for different wines. As long as a particle of sugar remains and a particle of vegetable fermentative matter, this secondary or slow fermentation may, under favoring circumstances, take place. To whatever extent it may have gone, the resulting wine is turbid, because of opaque vegetable matter left floating in the condition of minute shreds. This vegetable matter may deposit, if sufficient time be given, or it may not, the result being dependent upon the nature of the wine. If it deposit naturally, the addition of finings may be dispensed with, racking into another cask sufficing to achieve the desired object; if otherwise, some sort of finings must be used. Various materials have been used for this purpose from time to time, such as white of egg, milk, gelatine, isinglass, &c. Whatever the clarifying material used in any particular case, the deposit should be allowed time to settle, and the clear wine racked off.

Testing the Purity of Bees-wax.—The substances with which bees-wax is adulterated—for example, suet, stearine, vegetable wax, &c.—dissolve almost completely when the bees-wax is treated with about fifty times its weight of rectified ether. To discover the pulverulent, mineral and vegetable impurities sometimes fraudulently added to wax, such as fecula, talc, &c., treat several grammes of wax with warm rectified spirit of turpentine; the whole should dissolve; if there is a residue, throw it on a filter, wash with the spirit, and determine the weight and nature of the adulteration. Then treat 1 gramme of wax with 50 grammes of ether; filter, wash the residue with cold ether, then dry in the air and weigh.

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Correspondence

Fracture of a Locomotive Fire-box.

MESSRS. EDITORS :—The engine "Pacific," belonging to the Western Railroad Corporation, and used as a freight engine between this place and Worcester, exploded on the 6th inst., when near Warren (about 25 miles from here) on her way to Worcester. This engine is one of a heavy class, and has been in use since 1857. Five persons were on or near the engine at the time of the explosion, and were all killed, leaving no one to tell the cause of the accident, if it was known to them. As the increasing number of this class of accidents invests it with a peculiar interest, I will endeavor to point out to you what seems to me a probable cause of this one. Of the pressure of steam in the boiler I know nothing, and must therefore look further. The fracture of the boiler was a small and simple one in the fire-box, directly under the door. The rivets around the lower half of the door were all broken off, and the stay bolts directly underneath were also broken. The boiler plate was but little fractured, showing the rivets and stay bolts to be weaker than the plate. The draw-bar is attached to the engine in a peculiar manner, though I cannot think it a judicious one; and in this case I think it the primal cause of the disaster. I send you a sketch to show this method. The draw box you will see is riveted to the outer shell, at the rear end of the boiler, directly under the furnace door, and this was the point where the fracture took place. When the engines were working there must have been a constant strain or a series of jerking strains upon the stay bolts, and they were doubtless fractured by this continual tension and thrust. I should like to know if this method of attaching the draw bar is a common one, and if any similar accident has resulted therefrom.

AN ENGINEER.

Springfield, Mass. Oct. 8, 1863.

[We are obliged to our correspondent for transmitting this information, as it will undoubtedly serve to call attention to one true cause of a majority of accidents arising from the use of steam, which in most cases is faulty construction or careless superintendence. The attachment of the draw bar to the fire-box, and the consequent additional and unnatural duty devolving upon the boiler at that point, was (as our correspondent premises) the cause of this disaster; and every engine so connected should be immediately altered and the clevis or jaw taking the end of the bar attached to the bottom of the foot board, which should be strongly bolted to the frame to bear the increased strain.—EDS.

Defects in the Construction of the Parrott Gun.

MESSRS. EDITORS.—Having recently visited Cold Spring Foundery, near West Point, I noticed the following defects in the manufacture and construction of the Parrott gun, and respectfully suggest the following improvements :—

The body of the gun is always cast solid, and then turned down and bored out. The gun should be cast hollow and cooled by Rodman's process. The chase and muzzle should be made according to Dahlgren's pattern, and but a thin skin of metal turned off, in order to preserve the strong external surface of the casting. While the cylindrical part of the breech is strengthened by the wrought-iron reinforce, the end of the breech (or part resisting the reaction of the gas in overcoming the inertia of the shot) is only strengthened by an increased thickness of metal. Cast the gun with a fillet around the end of the breech chamber, and shrink on a reinforce, having a closed convex breech, to strengthen both the sides and bottom of the bore. Attach the cascabel to the end of the reinforce. S. F.

Philadelphia, Pa., Oct. 8, 1863.

[Our correspondent does not seem to be aware that the cast-iron portion of the Parrott gun is bored straight through, and the breech closed with a screw plug.—EDS.

A CHEMICAL substitute for indigo has, it is said, been discovered in Paris, which may largely affect the Indian trade in that article.

The Cellular Construction of Ships' Armor.

MESSRS. EDITORS :—As much interest is felt in devising some cheap and effectual means for constructing an impregnable, sea-going iron-clad vessel-of-war. I have conceived the following plan, and submit it to public consideration, believing that it will be found superior to any yet offered.

I use semi-circular plates constructed of wrought-iron—say six to ten inches in diameter, and about an inch in thickness. These plates are to be arranged in the following manner :—I first put solid plates of wrought-iron—say three-fourths to one inch in thickness—over the whole frame of the vessel, thus giving a solid foundation for the heavy armor above. I then apply a layer of semi-circular plates extending from one end of the vessel to the other, which are to be bolted to the solid frame of the vessel. Over these plates another layer of iron is placed, all being well bolted to the plates below. I again apply another layer of plate, but in another direction, extending from one corner to the opposite one, laying it at an acute angle to the first tier of semi-circular plates below; over these plates I lay two or more tiers alternating with the semi-circular ones extending from side to side; and last of all I use a solid layer of wrought-iron—say two to three inches in thickness—bolted to the next lower tier. I believe this arrangement equal to a similar amount of solid iron. To increase the speed of the ship as a ram (I intend to have her such), there is to be a large paddle-wheel in the center, driven by two engines, one on each side, the same being out of danger from shot or shell. The great advantages gained by using the semi-circular plates instead of solid armor, are as follows :—

Suppose a shot or projectile should strike any portion of this armor, the tendency of it would be to penetrate the first or second plates; but upon striking the top of any one of the plates below, it would bounce or glance off because these plates, if struck on the top, would give way at the sides. Suppose, however, the sides were of the semi-circular plates, bolted fast as in other vessels, it would take as hard blows to smash them down as it would to penetrate them. The whole amount of solid iron is in all only about 6 or 7 inches, but I claim as great a resisting power as if the whole amount of iron represented by the thickness or depth of the plating from outside to the ship's hull were applied. As these tubes are always supplied with air, they are, of course, rendered perfectly buoyant, which detracts measurably from the dead weight of armor; and if penetrated by shot, or filled with water, the ship would still float. The manner in which I have arranged these plates renders them not only shot proof and buoyant, but they also act as supports to the frame and the heavy armament, as it can be seen that the first layer extends the whole length of the vessel, while the second reaches from one corner to the opposite one, and the third from side to side; which is in effect the principle of tubular bridges.

CHARLES BARRITT, 184½ East 23d street, N. Y.

Extreme Activity in Machine Works.

The following items from the Boston *Commercial Bulletin*, will give some idea of what is being done in the machine shops and founderies of the country :—

SOUTH BOSTON.

The Bay State Iron Works, which is one of the largest concerns in this State and employs 500 men, will be in full operation again this week. It is engaged in rolling railroad iron and plating for iron-clad vessels. The mills have been silent since the recent fire, but are now again in full blast, running as usual, day and night.

The Marine Iron Works and the engine factory of Mr. Aquila Adams, give employment in the first establishment to 170 men, and in the latter one to 100 men. The monitor *Chimo* is building, and Mr. Adams is about to erect two additional ship houses of 350 feet in length, so as to perfect the construction of the very largest class of iron vessels; he is also building a steam riveting machine for cylinder boilers—a new thing in this State. At the lesser establishment, in Foundery street, he turns out marine and stationery engines, sugar mills, &c.

The Globe Iron Works employ 300 men. The largest class of engines, locomotives and machinery are manufactured here. The monitor *Suncook* is being entirely constructed at this establishment, and will be finished in April. The machinery and a 60-inch cylinder engine for a sloop-of-war is under way.

Messrs. Alger & Co's., foundery, machine shop and famous ordnance factory, employ 350 men and run night and day. At the old building are manufactured 11-inch guns, shot and shell; in the new establishment at the corner of Dover street bridge, the 15-inch guns are cast and finished. There are fifty guns in the various stages of completion on hand, eleven of which weigh 38 tuns when cast, and 25 tuns when finished. The three furnaces at the new foundery can run at one casting 75 tuns of iron or brass.

The Norway Iron Works employ 185 men, working day and night, who turn out wire rods and steel manufactures. Messrs. Naylor & Co., are widely known as the agents.

The Pembroke Forge keeps four trip hammers running day and night upon Government work. Eighty men are employed in making traversing bars, on which the guns on forts are revolved—also the port stoppers of monitors; each one consists of a piece of wrought-iron seven feet in length and weighing ten tuns! The agents are Wm. E. Coffin & Co. The boiler explosion which injured three men, will not affect the running of the works.

PHILADELPHIA ITEMS.

The Pencoyd Iron Works, steam forge and rolling mill, near Philadelphia, A. & P. Roberts proprietors, is in full operation, employing about 150 men. The leading products of this establishment are rolled car axles, bar iron, hammered car and locomotive axles. They also manufacture sugar-mill, steamboat and steam-engine shafts, forgings, &c.

More than a thousand hands are now employed at the great rolling mill and forge of Seyfert, McManus & Co., Reading, which is in full blast; producing a vast variety of goods, such as round, square and flat bar, hoop and scroll iron. This house has been very successful in the manufacture of armor plates for vessels. Their machinery is of the most approved kind. One of their steam hammers is capable of giving a 12-tun blow.

The extensive Iron Foundery of Chase, Sharp & Thompson, is said to be the largest in this country, and capable of turning out 80 tuns of castings per day. They have added a large number of entirely new goods to their list the present year, and their assortment of stoves is as complete as any in the world. During the rebellion they have turned their attention to the production of shot and shell. Over 200 men are employed.

The Iron Hollow-Ware Foundery of Savery & Co., is turning out nine tuns of shot and shell per day besides other castings. The enameled ware for the use of manufacturing chemists, druggists, &c., has grown much into use, and is pronounced superior to that of English manufacture. About 100 hands are employed at these works.

Wm. H. Burr built a new and commodious shop last May, at Nos. 126 & 128 Reed street, where he carries on the manufacture of boilers in all their variety. Mr. Burr is just now executing a very heavy marine boiler of iron ⅝-inch thick.

The Iron Foundery and Machine Shop of Le Van & Adams is doing a large business, employing over 30 hands, and turning out a variety of work. Messrs. Le Van & Adams are men of much ingenuity as mechanical engineers, and spare no pains or expense to keep thoroughly posted.

THE VALUE OF LITTLE THINGS.—On another page will be found an engraving of a yeast riser—a useful article in families, &c. Let others take a hint from this inventor and look further into the labor and expense of housekeeping to see if they cannot do something to lighten it. As the case now stands there is by far too much muscle, time, and money expended *in mere living*, so that many very worthy housewives have no sooner begun the day than they are ready to rest; running here and there has tired, or clumsy apparatus has so worried them that they are ready to weep from vexation. Very much has already been done in this respect, but much still remains unaccomplished, and there is no class of invention more profitable than that one which sells for a small sum and is adapted to every household.

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Improved Smut Machine.

The immense increase in the value and quantity of the grain crop annually harvested in this country has called for the introduction of special machinery to cleanse and otherwise prepare it for transportation. These machines remove all the unmerchantable portions, such as chess, dirt, shriveled grains, chaff, &c., and leave nothing behind but the pure and thoroughly-cleansed grain. Such machines are useful, not only in large grain depots, but to millers and others, who have large quantities of grain to grind. The accompanying engraving represents to sink down the separator, P, and is discharged at O, in a clean state; the smut, and white caps, or chaff, which has passed out of the dust flue being carried under the screen wire with a portion of the air.

This machine has many advantages, a few of which are here mentioned. It takes the grain through all the different modes of clearing it from dust, and is so arranged that the scourer can be set as close as is desired; the fan is a self-regulator, and it makes no difference in its operation how fast the machinery may run; it is so constructed of metal that there is no

Fig. 1

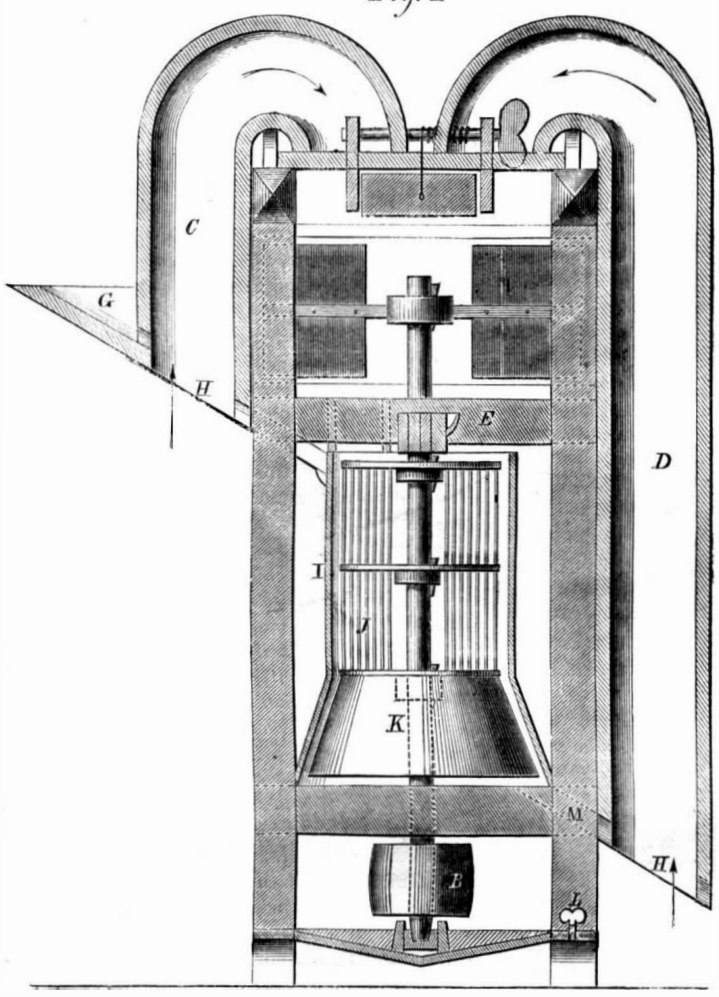
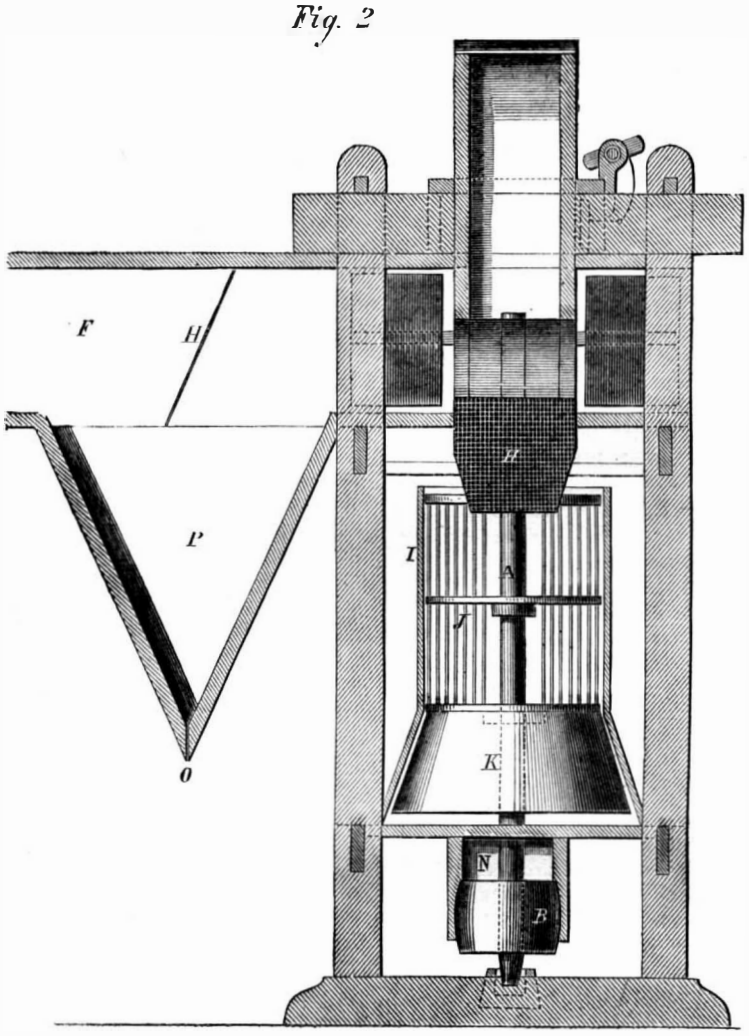


Fig. 2



WILLIAMS'S IMPROVED SMUT MACHINE.

One of these machines in section; and a description by the inventor is appended, reference being had to each figure alternately.

When the shaft, A, is rotated by a belt passing over the pulley, B, it causes a strong current of air to pass up the suction spouts, C D E, into the fan, which is expelled through the dust flue, F. The grain to be cleaned is let into suction, C, at G, and as it passes over the wire screen, H, it is subjected to the first blast of air passing up, as shown by the arrows, which carries with it everything that is lighter than the grain; the grain then passes into the corrugated shell, I, where it comes in contact with the beaters, J. There it is beaten and dashed against the concave just mentioned, which operation causes anything that adhered to the grain to be detached and carried into the fan, through the suction spout, E. The grain then passes into the scourer, K, which is conical in shape and is set at the proper distance by the set screw, L; it then falls down the spout, M, into suction, D, and as it passes over the screen, H, it is again subjected to a third blast of air, which frees it from all impurities. The grain has thus received six operations in passing through this machine, as follows:—Separating in the suction spout, C; screening before entering the concave, I; beating; suction in passing up through scourer, K, beaters, J, and spout, E; scouring; and lastly receiving a blast of air in passing through suction spout, D. The cheat, smut, shriveled wheat, chaff, oats, dust, &c., are carried with the air into dust flue, N (Fig. 2), or separator, where it all comes in contact with the screen, H, which compels all that cannot pass through danger of fire from it; and it does not cost so much as other machines by 10 per cent. Patented by S. B. Williams, of Bridgeport, Ohio; for further information address him at that place.

SAGE'S YEAST RISER.

By inspecting the simple little device below the reader will see one of the most useful and convenient,

as well as economical of household utensils. Every housekeeper knows the discomfort and expense attending the use of fire to raise a spunge for bread during warm weather. In the engraving herewith presented we have a novel utensil which completely obviates this trouble and also enhances or facilitates liquids much longer than if the water was in contact with the outer case. This is the whole affair and it works to perfection, it having been in practical operation for some time in many families. The spunge may be set at bed time and in the morning will be found light and ready for use; the bread can therefore be baked in the early part of the day. There is a small aperture in the double wall to allow of the expansion of the heated air; but this we deem unnecessary, as all difficulty arising from that source would be of little moment. This is a very useful and convenient utensil, and was invented by A. A. Sage, of Memphis, Mich. A patent is ordered to issue through the Scientific American Patent Agency; for further information address the inventor as above.

Cost of English Marine Engines.—The engines of the *Prince Consort*, a new English ship-of-war, hav cylinders 92 inches in diameter by 4 feet stroke, fitted with link motion, auxiliary pumps, and all the usual appurtenances of a first-class steam frigate. The boilers are eight in number, have 3,840 tubes 6 feet long by 2½ inches inside diameter, and have an effective power of 1,000 horses, when working at 7 pounds pressure per square inch. The screw is of gun metal, has adjustable blades, is 21 feet in diameter, with an increasing pitch of from 20 to 25 feet, and weighs 15 tuns. For this machinery and all fixtures complete the English Government paid £50,-500; or $252,500, counting the pound at $5. In addition $5,000 is paid for putting the engines on board ship. The *Prince Consort* is an iron-clad vessel.

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NEW YORK, SATURDAY, OCTOBER 24, 1863.

GREEK FIRE—SHELL AND SHOT.

The statements which have been published respecting some incendiary shells stated to have been thrown into Charleston, by General Gillmore, seem to have set the whole country in a blaze of excitement. According to a very common mode of romancing adopted by letter-writers, these shells have been denominated "Greek Fire;" but there is no resemblance whatever between them and the genuine Greek Fire of ancient times. It is related that the former was discovered in 660, by a Greek engineer named Callinacus, who in that year destroyed a large fleet of Saracen vessels with it; and it afterwards became a terror to the whole Mahommedan races. It is described to have consisted of resin, saltpeter, sulphur, pitch, and camphor, mixed with turpentine, and made into balls with flax. It was ignited, then fired from arrows, or thrown by javelins on board of the Saracen vessels, when they were engaged with the Greeks in the hand to hand contests of those days. The compound was very inflammable, but its chief danger consisted in being capable of burning in water. Tradition conveys exaggerated ideas respecting its destructive effects. It would not produce much fear, nor very formidable results, on board of modern war vessels. The incendiary shells now called Greek Fire were first brought to public notice during the Crimean war, by J. Macintosh, who made experiments with them at Shoeburyness, England, and set inflammable materials on fire at a distance of 800 yards. A patent was secured for the invention in 1855, and the composition is described in the specification as follows:—"I fill diaphragm shells with naphtha, mixed with phosphorus and bisulphide of carbon, having a bursting charge sufficient to open the shell. When fired, the bursting of these shells scatters the contents in all directions, and the shower of inflammable material falling among troops ignites spontaneously, causing their immediate disorganization. Fired into shipping, these shells bursting on the deck below, scatter the inflammable material, and the spontaneous combustion which results causes injury to the crew, who are driven overboard, and the vessel itself is speedily consumed. Fired into harbors, dockyards and towns, the result is alike destructive and decisive."

A little volume forwarded to us by Captain J. Norton, from Rosherville, England, 1860, contains the following description of his incendiary shell for infantry:—"A leaden rifle shell is first nearly filled with bisulphide of carbon, then small bits of phosphorus are dropped into it, and the mouth of the shell is then closed with a cork projecting like that of a bottle. A leaden shell thus charged and adapted to the military rifle, will continue to burn for ten minutes, with an intense flame which cannot be extinguished with water." Such are the descriptions of the modern incendiary shells called by some persons "Greek Fire." As phosphorus was unknown to the ancient Greeks, of course it is sheer nonsense to credit them with the invention of this fire. Thus far, such incendiary shells seem to have produced but little mischief. An officer of the United States artillery lately informed us that he had made experiments and found them of no utility, owing to the inflammable liquid being so much scattered when the shells burst. He believed that if a considerable quantity of the inflammable liquid could be held together and thrown into one place, it would prove destructive, but this could not be effected with any of the incendiary shells which he had tried. For producing destructive results by setting wooden vessels, buildings and other combustible materials on fire, red-hot shot is more to be depended upon than liquid fire-shells. The modern method of producing such shot, is to fill shells with molten iron, then fire them from the guns. A small cupola has been put up on one of the English iron-clads for melting pig iron, thus to fill shells; but against armor-clad vessels of course such shot would be useless, as they would spatter against iron plates like balls of clay.

BEAM ENGINES.

In a recent number of the London *Mechanic's Magazine* (an excellent paper by the way), we notice a few lines appended to our article on "Piston Speeds of Beam engines;" said article having been courteously copied into the *Magazine*. The remarks referred to state that "from the dictum of the writer in favor of the beam arrangement we altogether dissent; the rapid increase in the number of direct-acting engines in Great Britain proves conclusively that the defects of the beam engine are not theoretical, but practical." In all courtesy we must say that the proof of this is not at all apparent. If a beam engine can make 700 feet per minute regularly in America, it can do so in England, or any other country; and if piston speed is any representative of, or has any consideration in determining the power of an engine, the American beam engines must be more efficient than English ones; and it only remains to perfect the latter so that they come up to the American standard in respect of economy and all other good qualities. The writer quoted also speaks of what a steam engine can do under unfavorable conditions; this is a paradox. If the conditions were not favorable, how could the engines perform what they do? Can he cite any cases of other classes of engines than the beam attaining such speeds as 700 feet per minute, and keeping it up as a regular duty? If so, we should be pleased to know of what kind they were: certainly not horizontal engines, nor yet those with side levers or oscillating cylinders. Even a locomotive with 5-foot drivers and 20 inch stroke, running at 60 miles per hour, makes but little over 1,000 feet of piston speed per minute; and yet here we have a beam engine of a nominal power of 1,454 horses infinite decimal, attaining a rate of piston speed per minute approximating to that of a first-class locomotive. The figures are largely in favor of the locomotive, as the drivers are smaller, the stroke shorter and the speed far higher than is ever obtained in daily practice on the best railroads in the country. When we consider the immense disparity in the momentum of the mass of matter in the two engines, it will be seen that, at the rate of speed mentioned, the marine beam engine is moving the faster of the two.

A few days since we were in Providence, R. I., and saw there a small beam engine, of the Corliss pattern, which had a cylinder 14 inches in diameter by 5 feet stroke of piston. This engine attains a piston speed of 620 feet per minute, and runs night and day continually, stopping only at meal times. Very likely there are horizontal engines achieving still higher speeds; but it does not seem as though the conditions could be very unfavorable to the attainment of such velocities; for if they were, the rates mentioned could not be attained by beam engines.

EDUCATING YOUTH FOR SCIENTIFIC PURSUITS.

Our attention has been called to a plan pursued in the Brooklyn Polytechnic Institute, whereby the scholars are thoroughly instructed both in the theory and practice of science. The idea of the instructor is to impress the mind of the pupil with the practical nature of the knowledge he is acquiring, and so fix it upon his mind that he will not forget it as soon as the hour of study is over. In too many instances students acquire an absolute dislike and an intense skepticism regarding the truths of science; and instruction of this kind has fallen into disrepute with many parents, solely because they have false ideas concerning it. The only way to make chemists, engineers, astronomers, *id genus omne*, is to educate young men for such branches; and to induce youth to fit themselves for such professions, enthusiasm and interest in known processes should be awakened. We know a very worthy lecturer who was once (it is now long ago) in the habit of exhibiting what he was pleased to term "chemical" experiments to a large school of boys. Owing to some want of faith in, or knowledge of immutable scientific laws, the individual referred to evinced considerable trepidation when about to prophecy the result of mixing certain liquids. On one occasion he held up two fluids in separate glasses, and informed the boys that a union of the two would result in the production of a bright blue color; it turned out unfortunately that a nasty gray one occurred, which so discomposed the professor that he ever after mixed the liquids first and announced the result triumphantly thereafter. We have cited this little episode as an instance of the necessity of accuracy in giving information of such a nature. In the Polytechnic school referred to we are told that it is customary to exhibit a small steam engine in full operation before the school, and that subsequently each part is detached and a dissertation given on the uses, &c., of the engine, and the relation of its parts to each other. The next day one of the pupils is required to deliver the lecture to his fellows, and so on (we presume) through a class. This plan is also pursued with reference to all other scientific studies, and cannot fail to be attended with the best results. The direct tendency is to lead young men to investigate closely the principles of the subject before them, and entirely precludes the liability to inattention or shirking which attends other plans. We should be glad to know that this very sensible innovation was introduced into other institutions throughout the country.

MECHANICS MASTERS OF THE WORLD.

A fine field for speculation and sober reflection as well, is afforded in the adoption of machinery in doing the work of the world. Paragraphists never tire in recounting the wonders of steam: essayists exhaust their rhetoric in recounting the wonderful deeds performed by iron and steel arms; and statisticians enumerate and detail at length the saving obtained by the use of quick-working and powerful tools instead of the slower methods of hand-labor. But each and all of these fail in conveying that vivid and intense appreciation of the indispensability of machinery to the existence of the world, as exhibited in the daily economy of society. No more striking proof can be found of the rapid innovations mentioned, than the vessels of war now in use, compared with the bluff-bowed, dull-sailing, heavily-armed frigates of old. We do not claim it as an original assertion, but it is none the less true, that the naval battles of the world will soon be performed by engineers and machinists; and the brave captains and admirals will find their occupations gone. In place of the gallant frigate standing down upon her adversary, turning heavily in her course and full of shot holes, we have a long, low, lithe vessel, unsightly to the eye, but deadly to the foe. She draws near with incredible swiftness, delivers a crushing fire from one or two guns, every shot of which tells upon her adversary; and instead of fighting for hours, either demolishes her antagonist in a few minutes or is disabled herself. In proof of which, witness the conflict between the rebel craft *Atlanta* and the monitors in Warsaw Sound. No exhibition of seamanship avails against twin screws, which allow a vessel to turn almost upon her keel, and manouver with the celerity of a dancing master; and it is not too much to say, in view of the continual improvement going forward, that in a short time our artillery will be so perfected that it will be impossible to render a vessel shot-proof and at the same time sea-worthy. It is, therefore, true that the art of successfully resisting the encroachments of foreign powers, or of prosecuting aggressive measures, rests in a great degree upon the skill, energy, intelligence and inventive talent of the engineering and mechanical professions. Of what use is it for a mariner to safely navigate an iron-clad ship through perils by shoal and storm, if he falls into an enemy's hand at last through weakness or faults of construction?

Great guns are peace-makers. If they disturb public quiet they also aid in restoring it; the long arm of the 300-pound Parrott gun at Charleston reached over all forts and struck heavily in the very citadel

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of the enemy. Here, again, are the science and skill of the engineer and mechanic made manifest. The enemy in fancied security lurked behind the protections *his* science taught him were secure: when lo! a stronger and greater than he reached over his guard and destroyed the illusion. So engineering science progresses. Possibly in turn the aggressor may learn from the assailed and be driven out; but now the engineer and the mechanic are masters of the world: and, in either event, the result will be due to a more perfect and thorough knowledge of the true principles of science and art.

THE GHOST ON TRIAL AND PATENTED.

The ghost which has caused so much wonder and excitement in the theatrical scenes, during the past six months, was first exhibited by Professor Pepper, at the Polytechnic Institute, London, December, 1862. Having made a *hit* with the public, he applied for and obtained provisional patent protection for the invention. But several other parties engaged in giving exhibitions of legerdemain, &c., in London, perceiving that Pepper's ghost was capable of conjuring up large and profitable audiences, determined to get up ghosts on their own account, and go into more than phantom competition for public favor. In this they were quite successful; and being thus encouraged, they resolved to go further, and oppose the issuing of the patent under the Great Seal: an instrument which if issued might possibly lay all their spectres, and the substantial profits arising therefrom. To this end, they lodged objections against the issuing of the patent, just before it was to receive the Great Seal in August last, and the provisional patentee was allowed one month to answer the objections. The trial of "the ghost" came off before the Lord Chancellor, on the 24th of September, and distinguished counsel appeared for both parties. Mr. Bower, for the objectors against Prof. Pepper, put in several affidavits to the effect that "the ghost" was somewhat of an antiquated personage, that he was well known to several public characters, and could not be justly claimed as the exclusive property of Prof. Pepper. It was averred that a respectable specter was shown in London in 1845, by Herr Dohler, the celebrated conjurer, and that it made the tour of the whole country with him. Other evidence of a similar nature was also produced; and in the course of the arguments on the subject, the Lord Chancellor himself stated that he had seen a ghost fifty-five years before, exhibited by the celebrated Belzoni. Upon the other side however, evidence was put in from no less scientific personages than Prof. Wheatstone and Sir David Brewster, to the effect that the invention was new; and no person knows more about such affairs than the latter. After hearing both sides fully, the Lord Chancellor came to the conclusion that this was a new ghost—quite different from all that had ever appeared in Old England before; he therefore directed the great seal to be attached to the patent—this being the first ever issued for such a distinguished but unsubstantial visitant. The celebrated ghost character which has attended Hamlet, the hapless prince of Denmark, ever since the days of William Shakespeare, never was so highly honored.

AMERICAN WOOL AND WOOLEN MANUFACTURES.

In an article upon "Mutton and Wool," in the *American Stock Journal*, J. R. Dodge states that there has been an increasing demand for long staple wool in preference to short and finer staples. The reason of this is stated to be owing to the rapidly multiplying varieties of new fabrics made from combing wools, such as moreens, damasks, cobourgs, orleans and other worsted goods.

In Maine there are thirty-two woolen factories running thirty-two sets of cards; in New Hampshire fifty-six, with two hundred and twenty-eight sets of cards; in Vermont, the same number of factories, with one hundred and twenty-two sets of cards; in Massachusetts one hundred and fifty-four factories, running nine hundred and ninety-nine sets of cards; in Connecticut ninety-three factories, with four hundred and nine sets of cards; in Rhode Island, fifty-six factories and two hundred and twenty-five sets of cards; in New York, two hunred and eight factories, with four hundred and forty-one sets of cards. They are devoted to the manufacture of satinets, cassimeres, cotton warp cloths, stocking yarn, worsted and woolen yarn, blankets and flannels, delaines, carpets, cashmeres, shawls, feltings, negro cloths and jeans, linseys, and a few other varieties of goods. A report on this subject was presented to the Boston Board of Trade, last year, by Mr. George W. Bond, who stated that in the other States there were about five hundred sets of cards in operation. None of the finest broad cloths are yet made in the United States. Long wool with a silky luster is preferred, especially for the fabrics used for ladies' dresses.

Silkiness of luster does not depend on fineness of fiber, but is found in perfection in certain long-wooled breeds of sheep. Almost all of the English wool is made into worsted goods. The old Lincoln sheep, with very long wool, makes a fabric of lustrous appearance, and the Romney Marsh wool has such silkiness and luster that it is nearly all sent to France for manufacture into beautiful imitations of alpaca and mohair. The various families of merinos, produce fine felting wools, valuable for broadcloths, and are almost the only breeds bearing wools of this character.

NEW BOOKS AND PUBLICATIONS.

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Civilization has no more powerful auxiliary than a liberal, well-conducted magazine. The popular ear, eye, mind and taste, is more thoroughly and speedily educated up to a high standard through such a medium than by any other. The love for the beautiful in art, science and kindred professions induces to peace and prosperity more certainly than alliances, offensive or defensive, between high contracting parties; and the surest bond of sympathy between two great governments or masses of people is a community of taste and feeling in the finer qualities of the mind. In the *British American* we notice with pleasure a new era in the history of Canadian enterprises of this sort; this being the first periodical, we believe, issued and conducted on anything like a similar plan. From a careful perusal of its issues since the commencement of the volume in May of the present year up to this time, we havo no hesitation in saying that it is a most excellent magazine, and if continued on the same basis, it cannot fail to exercise an important influence on Canadian society. We take it for granted that the matter is wholly original, and by native, or at least resident writers; those who have local interests and a desire to improve the public taste in modern literature; and we confess to no small surprise that the articles, miscellaneous, scientific, &c., are of so high a character. The tone of the *British American* is thoroughly liberal, and entirely devoid of pragmatical assumptions in its more abstruse articles; throughout it has a genial, well-met air which takes the reader captive at once. There is a vast field in Canada, in its early history, for the introduction of native romance, and sketches of every-day life among the *habitans*, Indians, half breeds, &c., who constitute the population of the bush and ruder districts; and the outlying countries, such as Labrador, the coast, and Island of Newfoundland, &c., are almost unknown in modern literature. We are pleased to notice that the publishers and editors are alive to the importance of this fact, and that they present interesting notes of travel through the localities above enumerated. We shall avail ourselves from time to time of such matter, feeling that it will aid in the dissemination of a more perfect knowledge of the country. We hope that the magazine will receive the liberal support its merits entitle it to.

Cultivation of the Camphor Tree.

The *California Farmer*, in alluding to camphor says:—"It is something more than a wonder that a tree, in itself so valuable, in production a necessity so absolute and so entirely susceptible of successful cultivation in the United States, should so long be totally neglected by our agriculturists. As the camphor tree is quite as hardy as any of our apple trees, there is, perhaps, no good reason why it should not succeed well wherever the apple tree will grow. It is indigenous to all parts of China, Japan, Formosa, Burmah and Chinese Tartary, and flourishes as far north as the Amoor country; but it is found in the greatest abundance along the eastern coast of China, between Amoy and Shanghae. In the districts of Kwang-tung and Fu-chein it grows in dense forests, the trunk attaining a size equaling that of any of our North American forest trees. The principal market for camphor lumber is Amoy, where some boards are 30 inches in width. The camphor gum of commerce does not in any case exude from the tree, as has been so generally supposed; but it is obtained from the leaves, twigs and smaller roots by distillation.

Steering Screw Propellers.

A series of experiments has lately been made at Sheerness, England, by order of the Admiralty, to test a new steering screw propeller applied to the gunboat *Charger*. The peculiarity of this propeller consists in having a ring, forming a universal ball or socket joint, placed within the boss of the screw, which is thereby connected with the main shaft. The entire weight of the screw is borne by the shaft, and by means of the tail or spindle of the screw projecting from the boss working in the rudder, whatever may be the movement of the rudder, it communicates an equal movement to the screw, which therefore becomes not only the propelling but also the guiding power of the ship.

A comparative trial of speed also took place between the *Charger* and the *Spanker*, twin boats, having been built upon the same model and lines by the same builders, and each containing engines of 60 horse-power. The distance run was about eight miles. In this distance the *Charger* beat the *Spanker* by 17 minutes, being 25 per cent gain, or equivalent to a mile and a half per hour. This gain is obtained by avoiding the retarding effect of the rudder, as it was found that to keep the vessel in her course the helm never varied more than from 3 to 5 degrees. By working the screw astern and putting the helm over 40 degrees, the vessel can be turned in about half the time above stated, and in a radius of only one-third its length, measuring from the screw itself. The screw can be applied in the dead wood of the ship, and lifted as in the ordinary way, so that the vessel may be governed either by the rudder or screw, or by both, at the option of the commander. This invention has been tried, and was abandoned in this country many years ago in canal propellers.

Packing Grapes.

S. Mitchell, of Steuben County, communicates the following in the *Rural New Yorker*:—

"Last fall, I instituted a series of experiments to ascertain the best method of keeping Isabella grapes through the winter; the result of which, no doubt, will be of interest to that portion of your readers who are lovers of this delicious fruit. They were all packed in boxes, one foot square and six inches deep, admitting three layers of clusters, and kept in a cool dry cellar; in fact, so cool during the winter that water standing in a pail would freeze half an inch thick. I am satisfied that the nearer the freezing point, grapes, and in fact all other fruits can be kept without actually freezing, the longer and better they will keep.

"Box No. 1 was packed with alternate layers of grapes and fresh grape leaves. Box No. 2 with alternate layers and colored sheet wadding. Box No. 3 with alternate layers of newspapers and grapes. Now for results. No. 1 kept fresh and nice until about the last of December, the fruit seemingly improving in flavor, and greenish clusters ripening up; when the leaves and stems of the fruit began to mold quite badly. No. 2 kept tolerably well until about the middle of December, when I found the cotton sticking to the grapes where they came in contact. No. 3 kept the best of the three by all odds. By changing the papers and repacking, I kept grapes until the 15th of March, perfectly plump and fresh, and most of the stems fresh and green. I know not how much longer they would have kept had I not used up the last of them at that time."

Extract of Logwood a Deodorizer and Disinfectant.—M. T. P. Desmartes, in *Comptes-Rendus*, relates that he has employed an ointment composed of equal parts of lard and extract of logwood with extraordinary success in removing fetid odors, and bringing about a healthy action in sloughing and gangrenous wounds. It cures hospital gangrene, he says, like magic.

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Mechanical and other Items of the War.

HIGH PRICES OF COTTON.—The Philadelphia *Ledger* says :—"The residue of the *Kate Dale's* cargo, consisting of 806 bales of upland cotton, was sold at public sale recently. There was an unusually large attendance, owing to the scarcity of cotton in the market, and higher prices were obtained than at any time since the war began. 20 bales brought 92½ cents per pound ; 10, 92¼ cents ; 20, 92⅛ cents ; and 82 bales 92 cents ; 603 bales were bought by Gardner & Co., of New York, extensive manufacturers, for 90⅞ cents per pound. The lowest price obtained for cotton in rather bad order was 82½ cents ; about the same that the best quality of upland cotton has been selling for in New York and Boston. The sale realized over $320,000, which, with the $49,000 obtained for the vessel, and the portion of the cargo sold a few weeks ago, makes a total of $369,000. The *Kate Dale* was captured by the steamer *R. R. Cuyler* after she had been detached from the squadron, and the prize money will consequently be divided among her officers and crew."

THE ORDNANCE BUREAU OF THE WAR DEPARTMENT.—The *National Intelligencer* says that Col. Ramsay, lately in charge of the Washington Arsenal, has been appointed Brigadier-General and assigned to the charge of the Ordnance Bureau of the War Department, a position which he has held since the retirement of Gen. Ripley. We record this appointment with great satisfaction, because we are assured that the Secretary of War could not have confided the interests of this important Bureau to more faithful hands. Ardently devoted to the cause of the Government, and enthusiastic in the profession which he adorns, Gen. Ramsay, we are sure, will bring to the discharge of his new duties the same zeal, intelligence, and industry which have marked his administration of the Washington Arsenal, and in token of which he has just received this honorable promotion at the hands of his military superiors.

A trial of the engines of the new steamer *Pequot* was made recently, with the most satisfactory results. These engines are the invention of Mr. Wm. Wright, connected with the firm of Woodruff & Beach, of Hartford, Conn. The authorities at the Charlestown Yard, Mass., express the highest opinion of these engines, and one of the most eminent scientific men in the country who has witnessed them in operation believes that they are based on a principle destined to effect a complete revolution in the plans on which engines are now constructed. In the trial they made 110 revolutions per minute. The maximum of the common engines is but little over 60 revolutions. They worked with great steadiness and very little noise. The cylinders are the segment of a circle.

HARBOR DEFENSE.–Two correspondents—Mr. Joseph Walter, and Mr. J. Troop—write us proposing plans for harbor defense similar to those advocated by us in a previous number. Mr. Troop suggests that the buoys be so constructed by means of valves, &c., that they can be filled with water and sunk, and by the use of water-tight hose be supplied with compressed air of such a density as to expel the water and reinflate the buoys ; thus the chains can be floated directly or sunk at will.

THE Volunteer Engineers at Morris Island have a society among themselves to assist the families of any of their number who may be killed or disabled. Thus, the other day $200 was promptly sent to the widow of Sergeant Clark, who was killed. This beneficent institution does not cost the members nearly as much as the glass of beer so thoughtlessly purchased by many soldiers.

NEW SLOOPS OF WAR.—The Newburgh (N. Y.) *Times* says that the Washington Iron Works Company of that village has recently made a contract with the Government for fitting up two sloops of war at a cost of $400,000 each.

[$400,000 would buy a fine sloop of war complete from keel to main truck.—EDS.

The Government has now on hand in the arsenals 700,000 stand of arms, 500,000 of which are effective, and the number is rapidly increasing. There are also on hand 2,400 24 and 32-pounder smooth-bore cannon, which are rapidly being converted into effective guns by the rifling process.

IN WORKING ORDER AGAIN.—The Norfolk Navy Yard, which the rebels destroyed, has been in a great measure restored, at least so far that vessels-of-war are now repaired and altered at that station. There has not been much money expended on it, for a prejudice seems to exist against it ; but Government officers, out of the ruins, have reconstructed the dry dock and converted the old pump into a new one at comparatively small cost. Nine vessels-of-war are now at that station undergoing repairs or being converted into "double-enders," and twenty-two have been altered and repaired. The wants of the service have been so exacting that every place where ships could be built or repaired has been required for Government use, and the Norfolk yard has forced itself into favor in consequence.

RAISING THE SUNKEN VESSELS IN CHARLESTON HARBOR.—Charles H. Sanborn, of Boston, has proposed to the Navy Department to raise the steamers *Georgiana*, *Ruley* and *Isaac H. Smith*, and any or all other vessels sunk in or near the harbor of Charleston, S. C., for a salary of fifty per cent of the net proceeds of what may be recovered ; or will pay one thousand dollars for each of the above-named steamers as they are ; or will raise said vessels and property, and will make return of all that may be recovered to some Court of Admiralty for adjudication of the amount of salvage to be paid to him.

REBEL complaints about Gillmore's use of Greek fire assume a very ludicrous aspect when read in the light of certain official reports now in the Navy Department. These reports state that the shells loaded with Greek fire, formed part of the supply of ammunition found on board the rebel steamer *Atlanta*, when she was taken on the evening of her sailing to bombard New York and Philadelphia.

A TORPEDO was recently exploded under the bows of the new *Ironsides* in Charleston Harbor. The rebels floated it down from the city attached to a raft, and on coming in contact with the bow of the *Ironsides* it exploded with great violence, throwing a large quantity of water on board, killing one man, and putting out all the fires on board. It is stated that no damage was done to the vessel herself.

ANOTHER blockade-breaker, the *Diamond*, has been captured off the coast of Georgia. This ship is said to be fast, and has a large oscillating engine and two boilers. She was last from Glasgow. She is worth, with cargo, $100,000. Two notorious men, owners of vessels engaged in contraband traffic, were taken in the *Diamond*. These men exhibited large umounts of gold, and are said to own shares in many vessels engaged in running the blockade.

Bruised Oats for Horses.

A horse fed upon whole oats and uncut hay, expends a large proportion of his motive power in the process of mastication. After a hard day's work he has before him the task of reducing to pulp 15 or 20 pounds weight of hard food, and the operation is carried on during the hours which ought to be devoted to repose. Not unfrequently is the animal so tired that he is unable to properly chew his food ; he, therefore, bolts the oats, a large proportion of which passes unchanged through his body. Those who desire to render fully effective the motive power of the horse, must pay attention to the mechanical state as well as to the quality and quantity of his food. The force expended by the horse in comminuting his food —when it is composed of hay, straw and oats—may be set down as at least equal to the power he expends in one hour and a half of work, such, for example, as plowing. The preparation of his food, by means of steam or water power, or even by animal motive power, would economise by at least one-half, the labor expended in its mastication : this would be equivalent to half a day's work in every week—a clear gain to the animal's owner. It has been objected to the use of bruised oats, that they produce a laxative effect upon the animals, but this disadvantage may be easily obviated by the addition of cut straw to his food.

MR. SAMUEL FOREST, one of the English mechanics who came to Waterbury, Conn., 40 years ago to make the brass gilt button, which was then worn by gentlemen generally, died one day last week. He worked for the firm of Leavenworth, Hayden, & Scoville, and theirs was the first button factory in this country.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list :—

Condenser for Steam Engines.—This invention relates to an improved mode of maintaining a vacuum in the condensing tank, in order to increase the freedom of the exhaust and inject condensing water by atmospheric pressure. The condenser is elevated to a hight of thirty-three feet or more above the mouth of the discharge pipe, and the latter immersed in water. The air being blown out of the tank by means of steam from the engines or boiler, and the steam allowed to condense, a vacuum is formed within the tank, causing water to rise in the discharge pipe to a hight of about thirty-three feet. The injection cock is then opened, and the condensing water is forced into the tank by atmospheric pressure, and flows down the discharge pipe, the hight of said pipe preventing any water remaining in the tank. The engine being now started, steam will enter the condenser and be immediately condensed by contact with the stream of water constantly descending through the condenser, and the water of condensation mingling with the injection water, passes off through the discharge pipe without impairing the vacuum within the tank. The apparatus constitutes a siphon, with a vacuum chamber in its upper part. For a surface condenser the parts are so proportioned that the chamber in the upper part of the siphon will be kept constantly filled with the water which passes through it. The vacuum or condensing tank is inclosed within this chamber and is kept cool by the water flowing constantly in contact with its walls. Steam is exhausted into the inner tank, and becoming condensed by contact with the walls, the water of condensation is carried off as before through a pipe extending downward to a distance of at least thirty-three feet, so as to maintain a vacuum within the tank by the gravity of the discharged water. The inventor is George I. Washburn, of Worcester, Mass.

Sewing Machine.—This invention relates more particularly to sewing machines for sewing in the soles of shoes and boots, and especially to the sewing on of soles which are prepared for sewing, as described in Letters Patent No. 925, of 1861. The object of the first part of the invention is to provide for the use of tacks for the attachment of the upper to the sole and last for sewing in a sewing machine, instead of requiring to whip the upper and sole together before sewing as has commonly been practiced in sewing-machine work ; and to this end it consists in the attachment to a sewing machine of a tack-drawing instrument, operating to draw the tacks as fast as required to prevent their interference with the sewing operation. A second feature consists in an arched needle die standing above the plate or bed of the machine, in such form and manner as to adapt itself to the concavity of the sides of the shank of the shoe in sewing on the soles. And a third feature of the invention consists in the combination of a serrated or roughened surface on the presser, and a similar surface on the needle die to prevent the work from being drawn from between the presser and die by the operation of the needle or the other stitch-making devices. Luther Holden and Stoughton B. Holden, of Woburn, Mass., are the inventors of this improvement.

Field Fortifications.—This invention consists in the employment, in the construction of field fortifications and embankments, of light boxes of wood or other suitable material, made in the form of voussoirs, and built up into an arch and afterward covered with earthwork to any depth. By leaving suitable openings in the arch to form ports, its interior is made to form a casemate. It also consists in the construction of such boxes or hollow voussoirs in such manner that they may be folded up and each carried by a soldier, behind his knapsack or otherwise, without inconvenience. An illustration and full description of this invention appears on the first page of this number of our paper.

THE mischievous practice of feeding horses and sheep with wheat is alluded to in English papers. Four horses were nearly, and some sheep quite, killed in Hampshire lately in this manner.

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ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 6, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

40,152.—Harness Snap.—Philip Beckman, Naperville, Ill.:

I claim a snap having the spring, b, applied to it sshank in a reverse direction and provided with a guard, d, and stop, e, to operate in combination with said spring, substantially as and for the purpose shown and described.

[This invention consists in securing the spring to the shank of a snap-hook in a reverse position, its butt end being fastened to the shank near to the bend and its loose end extending beyond the point of the hook, close to a guard rising from the shank and under a lip or stop projecting from said point towards the spring, in such a manner that a strain on the ring retained by the snap is sufficient to release the same without the necessity of depressing the spring with one hand and releasing the ring with the other, and further-more when the ring is in the hook, it is securely retained by the combined action of the stop and spring, and the spring is not liable to be subjected to an undue strain and to break or get deranged.]

40,153.—Bullet for Fire-arms.—George W. Billings, New York City. Ante-dated Sept. 21, 1863:

I claim the bullet, A, in combination with the plug, B, and the flanged ring, C, substantially as described and set forth.

40,154.—Process of Rolling Hemp and Flax.—George W. Billings, New York City. Ante-dated Sept. 21, 1863:

I claim the enclosing the flax and hemp in a tank with warm liquid under pressure, substantially as described and set forth.

I also claim the use of the liquid from previous operations by mixing the same with warm water, substantially as described and set forth.

40,155.—Flax and Hemp Drying Frame.—George W. Billings, New York City. Ante-dated Sept. 21, 1863:

I claim the frame, A A A, and hoops, B B, in combination with the loose hoop, C, substantially as described and set forth.

40,156.—Shoe for Car Brakes.—James Bing, Philadelphia, Pa.:

I claim, first, The shoe, A, and sole, B, both being constructed and adapted to each other substantially as described, so that the sole can have a lateral rocking movement on the shoe for the purpose specified.

Second, The combination of shoe, A, sole, B, clevis, D, and bolt, G, the whole being constructed and arranged substantially as specified.

40,157.—Boiler.—Clarissa Britain, St. Joseph, Mich.:

I claim, first, The ordinary form of inner kettle, E, when constructed with a perforated bottom, flange rim, c, closely fitting, but removable cover, G, and steam lid, h, as an auxiliary to a potato-boiling kettle, C, substantially as and for the purpose described.

Second, Combining with the two kettles, C and E, constructed substantially as set forth, the removable steam escape pipe, D, cover, C′, and lid, a, arranged and operating substantially as described.

Third, Providing the kettle, E, with hooked legs, d, for the purpose described.

40,158.—Riding Saddle.—J. Chenoweth, St. Mary's, Ohio:

I claim a riding saddle, provided on each side with a spring, E, bent in C-shape, and connected at its loose end with the pommel, B, by means of the flat seat strip, D, all in the manner shown and described.

[This invention consists in the arrangement of two C springs, one being secured to either side of a saddle tree and extending back over the cantel in combination with two flat strips of sheet steel hinged with their front ends to a staple inserted into the pommel and with their rear ends to the loose ends of the C-springs, in such a manner that on placing the seat upon said flat strips, an elastic seat is produced, either side of which is capable of accommodating itself to the motions of the rider and of the horse independent of the other side.]

40,159.—Washing, Wringing and Mangling Machine.—Edgar Chipman, New York City:

I claim the combination of the counter-poised oscillating suds-box, A, with the roller, C′, and the rollers, C C, or equivalent bearings, and sliding bed, D, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of an oscillating cylindrical or semi-cylindrical suds-box, provided with weights or counterpoises, and also provided with a fluter roller, in combination with pressure rollers and a sliding bed; all being arranged in such a manner as to form a new and useful combination of a washing machine, wringer and mangle.]

40,160.—Stump Extractor.—D. A. Danforth & D. C. Payne, Elkhart, Ind.:

We claim, first, An upright oscillating frame constructed so as to move forward backward in such a manner that the stump can be removed from its bed by the operation of the forward movement of said frame and carry the stump with it.

Second, In combination with the arms, K and M, and roller, H, we also claim the chain, R, adapted to the stump by means of the loose ring, Z, in the manner and for the purposes herein described.

Third, We also claim the arrangement and combination of the oscillating upright frame, B, with its roller, H. adjustable posts, E, and arms, K, and M, arranged and combined as herein described and for the purposes set forth.

Fourth, A stump extractor having an upright oscillating frame constructed so as to move forward and backward, operated and combined with the stationary block, v, rope, x, and pulleys, P P P and L, on the arms, K and M, for the purposes of extracting and removing from their beds, stumps and trees, in the manner and for purposes herein described.

40,161.—Sash Holder.—John Davis, Council Hill Station, Ill.:

I claim the cylinder, C, one or more, provided with a spiral groove, h, in which pulleys, j, on arms, k, attached to the sashes, work in combination with the springs, E, connected with the cylinders, and all arranged to operate as and for the purpose herein set forth.

[This invention consists in applying to a window frame one or more cylinders each of which has a spiral groove made in it to receive a roller attached to a sash, the cylinders having each a coil or barrel spring connected to them, and all arranged in such a manner that the sashes may be raised or lowered with the greatest facility and retained at any desired point.]

40,162.—Metallic Boot and Shoe Heel.—Martin C. Easterly, Antwerp, N. Y.:

I claim a metallic heel for boots and shoes composed of a shell, A, of the proper form or shape, having a top plate, a, at a short distance below the sides and back of the shell, and the latter having horizontal projections, b, within it, with a beveled inner surface below them, against which a plate, B, having a beveled edge is secured by screws, e, the shell or heel, A, being secured to the sole by screws, d′, which pass through the top, a, substantially as set forth.

[The object of this invention is to obtain a boot heel which will be very light, perfectly water-tight and still be durable and admit of being readily applied to the boot and shoe heel.]

40,163.—Ripping Instrument.—Wm. A. Fitch, Brooklyn, N. Y.:

I claim in a ripping instrument the separator, c, and cutter, e, substantially as set forth, and in combination therewith, I claim the projection, b, and mouth, d, for the purposes and as specified.

40,164.—Apparatus for Supporting and Ventilating Wounded Limbs.—George S. Fowler, New Castle, Maine:

I claim, first, The rubber, L, arranged in the manner and for the purpose herein specified.

Second, The water and ice reservoir, P, in combination with the rods, n, the rods, o, the legs, d, and the concave, G, the whole constructed and arranged as herein set forth.

40,165.—Cross-cut Sawing Machine.—Joseph Frey, Battle Creek, Mich.:

I claim the pitman guide attached to the movable arms, L L, and saw guide attached to a bar, A, moving on the hinge as represented in the drawings in combination with the lever, G, for raising and lowering the same at pleasure, and also for holding the same up by bringing said lever under the cross bar, F, while adjusting the log.

40,166.—Pianoforte Legs.—Allen Goodman & Lorenzo Hale, North Dana, Mass.:

I claim a pianoforte or billiard table leg having at any desired point or points on its periphery a number of pieces of wood with their grain running circumferentially around the leg or at right angles to the axis thereof, and at or about at right angles with the grain of the pieces of wood which constitute the body or principal part of the leg, as herein set forth.

[Pianoforte and billiard table legs are constructed of a number of pieces of wood glued firmly together to form a bolt or stick of proper dimensions and the stick then turned or planed in polygonal form, wholly or partially, according to the desired design. These bolts or sticks are quite liable to check, especially at their larger diameter, and the object of this invention is to obviate that difficulty. To this end the invention consists in glueing to the stick or bolt at its periphery sticks or pieces of wood, the grain of which will extend around around the stick or bolt at right angles with the axis thereof, so as to perform the function of hoops or bands.]

40,167.—Mold for Casting Chilled Rollers.—A. Hammond, Jacksonville, Ill.:

I claim the mold composed of the cylindrical middle flask or chill, A, and the two flasks, B C, made with sockets, e e, and plates, d d, faced to fit the flanges of A, the whole combined, substantially as and for the purpose herein specified.

[This invention consists in a certain construction of a mold for casting chilled rollers, whereby not only the peripheries but the ends of the rollers, the journals and the portions which receive the gears are chilled and made perfectly true with the peripheries, and the portions which receive the gears are made with feathers or key seats.]

40,168.—Oil Still.—Charles A. Hardy, Pittsburgh, Pa. Ante-dated Sept. 25, 1863:

I claim the use of a cylindrical still (for distilling coal oil without the direct application of a furnace), such still having an inner or false bottom, forming a hot air or steam space on the under side of the still, substantially as described.

40,169.—Flyers for Spinning Machines.—Daniel Hussey, Nashua, N. H.:

I claim my improved flyer, made substantially as described, viz: with the flexures, e f g h, in each leg, or with the same and having the legs lapped, formed and connected at the base, substantially as specified.

40,170.—Sheep Shears.—George F. Johnson, Marshall, Iowa.:

I claim a sheep shears provided with a rod or guard, F, substantially as herein set forth.

[This invention consists in the employment or use of a guard attached to an ordinary sheep shears in such a manner that the animal cannot be cut during the operation of shearing.]

40,171.—Artists Easel.—George W. King, Perth Amboy, N. J.:

I claim the application of the lever, C, in combination with the grooved bars, B′ B″, and slides, D D′, substantially as set forth.

40,172.—Boiler.—T. S. Lambert, Peekskill, N. Y.

I claim, first, The application of the partition, I, so as to increase the surface upon which the water acts in passing from the boiler between the cylinders back to the boiler, substantially as set forth.

Second, The application of the hood, C, so as to increase the surface upon which the heat produced in the furnace acts, substantially as set forth.

Third, The combination of the boiler, A, the furnace, B, and the hood, C, in the manner and for the purposes substantially as set forth.

40,173.—Hat Rack.—T. S. Lambert, Peekskill, N. Y.:

I claim the combination of the hooks, D, the brackets, C, and the frame, B, substantially as set forth.

40,174.—Cooking Stove.—T. S. Lambert, Peekskill, N. Y.:

I claim, first, The application of the slide, A, to the bottom of the grate rest, substantially as set forth.

Second, The application of the slide, d, to the half of the under surface of the grate, substantially as set forth.

Third, The combination of the grate rest slide, and the grate slide, d, substantially as set forth.

Fourth, The combination of the hooks, D, the slide, c, and the slide rests, P, substantially as set forth.

Fifth, The application of a movable bracket to the upper back part of the stove, substantially as set forth for the purpose of sustaining the reservoir boiler.

Sixth, The construction of the opening and slides in the upper part of the back within an extended bracket for admitting heat directly to the reservoir, substantially as set forth.

Seventh, The combination of the bottom and side jackets with the reflecting baker, substantially as set forth.

40,175.—Chair.—Carl Oscar Lundberg, Chicago, Ill.:

I claim the foot frame, B, when applied to a chair having a front elevation of about thirty degrees, substantially as set forth and specified.

40,176.—Rock Drill.—Loomis G. Marshall, Philadelphia, Pa.:

I claim the arrangement of the drill itself with the blades or wings to expand, making the excavations at the bottom to hold a large quantity of powder.

40,177.—Felly Machine.—Robert Massey, Philadelphia, Pa.:

I claim, first, Two reciprocating saws, L and L′, in combination with the devices herein described or the equivalents to the same for holding the plank, and causing the same to move in the arc of a circle, for the purpose specified.

Second, The blocks, i i′ i″ and i‴, arranged for securing the saws and adjusting the same on the saw frame to suit fellies of different sizes, substantially as set forth.

Third, The reciprocating saws, L and L′, in combination with the table or platform, M, and rollers, P, the whole being arranged and operating substantially as and for the purpose described.

Fourth, The adjustable and yielding arm, p, when arranged in respect to the saws, and for bearing on the plank, substantially as set forth.

Fifth, The weighted arm, T, with its roller, u, when arranged for bearing on the plank, substantially as described for the purpose specified.

Sixth, The rack, 20, furnished with the jaws herein described or their equivalents, for holding the plank, in combination with the sliding frame, 13, and shaft 12, the whole being arranged to so operate that the rack can be moved forward definite distances, and at the same time be so turned that the plank can be moved in the arc of a circle as described.

Seventh, The adjustable stops 17 and 18, and rack 20, in combination with the pawl 28, and the intermediate devices or their equivalent, whereby the said stops are caused to operate the pawl, and move the rack in the manner described.

Eighth, The lever 33, arranged and operating for locking the rack, substantially as described.

Ninth, The sliding block 50, arranged and operating for maintaining the lever 33, out of gear with rack during a portion of the movement of the machine as set forth.

Tenth, The arm 39, sliding rod, 36, its hangers, 40 and 41, when arranged for operating the weighted lever, 43, and through the latter and other appliances herein described or their equivalents for reserving the motion of the plank.

40,178.—Caloric Engine.—Henry Messer, Roxbury, Mass.:

I claim the introduction of steam into the furnace of a hot air engine, in which pressure is maintained, when the steam is entered in immediate juxtaposition with the incandescent fuel for the purpose of wholly decomposing it into its constituent gases and mingling them with the compressed heated air and gaseous products of combustion within the furnace.

Also regulating the speed of hot air engines, by automatically controlling the amount of steam admitted into the furnace with a valve in the steam pipe connected with the furnace, when said valve is actuated by the engine regulators.

40,179.—Curry Comb.—Benjamin F. Neal, Poultney, Vt.:

I claim the combination of a swaged or corrugated sheet-metal back plate and single sheet metal teeth bars with straight back edges, in curry combs. The swagings or corrugations of the back plate to be of sufficient depth to brace and support the teeth bars without side projections on them. The swagings or corrugations of the back plate to be cut through on a line with the teeth bars, and in depth down to the surface of the back plate and of sufficient width for the thickness of the teeth bars into which the edges of the teeth bars are placed and headed down on the opposite side within the concavities of the back plate.

I also claim swaging the dove-tailed groove in the back plate to receive the handle shank between it and the teeth bars, so that when the teeth bars are fastened to the back plate, the handle shank is firmly secured to the other parts of the comb, without other fastening.

40,180.—Washing Machine.—T. E. North, McAllisterville, Pa.:

I claim the washboard, A, and the concave made of rollers, B, combined with the swinging, revolving, rolling cylinder, the two adjustable pins, N, between frame, H, and cylinder, J, and the concave top rubber, M, substantially as and for the purpose specified.

40,181.—Carding Machine.—Lawrence O'Brien, Indianapolis, Ind.:

I claim the arrangement of the roll, D, between the endless apron and the main cylinder, A, substantially as and for the purpose herein shown and described.

[The object of this invention is to return to the main cylinder of a carding machine all the fiber which drops from the machine in the carding operation, and thereby to prevent the machine making any waste: and to this end it consists in a novel arrangement of a card-clothed cylinder or roll, in combination with an endless apron below the main cylinder, whereby the fibers dropping from the machine are caught by the said apron, and by it delivered to the aforesaid cylinder or roll, by which they are returned to the main cylinder.]

40,182.—Belt Hook.—F. E. Oliver, New York City:

I claim the method of uniting two or more pieces of belt or driving band, by means of linked bars or rods, made of flexible material so as to allow of their being formed into clamps, substantially in the manner herein set forth.

I also claim as a new article of manufacture the belt-fastening, device herein described, the same consisting of linked or jointed bars or rods made of a flexible material capable of being bent, substantially as herein set forth.

40,183.—Mill Pick.—L. M. Osborn, Hamilton, N. Y.:

I claim, first, A rigid support with lips or sides, in combination with a yielding support, substantially as described.

Second, I claim a series of notches or indentations, substantially as described, or their equivalents, for the purpose of holding the blade at any desired distance from the center of the head, as set forth.

40,184.—Wardrobe Bedstead.—W. H. Pease, Dayton, Ohio:

I claim the arrangement of the sand box, P, the adjustable board, b, the screws, d d, and the cords or flexible slats, c c, in the manner and for the purpose herein set forth.

40,185.—Apple Parer.—E. L. Pratt, Boston, Mass.:

I claim keeping the knife and cutter head from the surface of the apple, after the same is pared, in the manner and by the mechanism substantially as described.

40,186.—Baggage Check.—W. D. Richardson, Springfield, Ill.:

First, I claim as an improvement in the means of checking baggage the denoting on two sets of pieces of cheap material many stations, and designating by the locality of the punch mark on each piece the station at which the baggage is to be left, substantially in the manner and for the purpose herein set forth.

Second, I claim in the construction and use of baggage checks, the within-described arrangement of the check card, M, check holder, A B, strap, c, and hole, a, relatively to the check card, M, or its equivalent, for the purpose herein set forth.

40,187.—Gate Catch.—W. W. Robinson, Ripon, Wis.:

I claim, in combination with the double catches, C, the spring latch, D, when constructed and operated substantially in the manner and for the purpose set forth.

40,188.—Egg Beater.—Peter Schildecker, Pittsburgh, Pa.:

I claim an egg beater, consisting of the combination of a horizontal closed cylinder, having stationary arms, n n′, around and between which revolve a series of beaters, p p q, constructed and arranged substantially as described.

The use of the sliding funnel, w, to serve the double purpose of a door and funnel to an egg beater, constructed and arranged substantially as described.

40,189.—Composition for Poultices.—J. P. Scott, Newport, Ky.:

I claim the poultice mixture prepared, composed and compounded as described.

40,190.—Chill for casting Car Wheels.—Thomas Sharp, Chicago, Ill.:

I claim the employment of the reinforce, B, provided with the annular ledge, d, in combination with the segmental chill, A A, when the latter is constructed and provided with the two grooves, c c′, and the scarf joints, a a′, and all are arranged and operating substantially as and for the purposes herein delineated and described.

40,191.—Roofs of Buildings.—Josiah Shidler, Knox Township, Ohio:

I claim a roof composed of a series of jointless, straight-sided V-shaped troughs, A A, placed side by side in combination with the notched plates, y, and a second series of narrow jointless straight-sided V-shaped troughs, B, placed in inverted positions over the edges of the troughs, A A, all as herein described and for the purposes specified.

[This is an effective and durable form of roof, and is manufactured at small cost both in matter and labor.]

40,192.—Injecting and Douching Instrument.—Joseph Singer, Chicago, Ill.:

First, I claim, with an air pump thus employed, the arrangement of the pipes, G H, and the valves, g and k, in the manner set forth.

Second, In combination with said pump so arranged, I claim the

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arrangement of the escape pipe, H, extending above the surface of the liquid, as set forth.

40,193.—Funnel.—J. D. Smedley, Chicago, Ill. :

I claim, first, In combination with a fluid-filling funnel, so adjusting the rod, t, by means of the nut, n, or its equivalent, that the cask can be filled to any desired quantity.

Second, The combination of the floor or division, s, of said funnel with the side passages, C, for the purposes and substantially as described.

Third, The combination and arrangement in a fluid-filling funnel of the pipe, t, rod, d, bob, i, division floor, s, side passages, C, for the purpose and substantially as described.

Fourth, Locating the bob, e, within the conduit, B, of said fluid-filling funnel and below the division or floor, s, substantially as and for the purpose described.

40,194.—Corn Planters.—J. L. Smith, Neoga, Ill. :

I claim the rod, g, the joint arm, h, the upright, j, the joint arm, o, the spring, s, the foot lever, T, the catch, l, the bar, L, the curved braces, H, and the furrow openers, F, the whole combined and arranged as herein set forth.

40,195.—Water Wheel.—J. W. Smith, Middletown, Conn.:

I claim the annular case, A, provided with a central partition, a, of concave form and its inner side, and dividing the case into two compartments, b c, which communicate with each other by openings, e e, in combination with elastic strip, q, rotating buckets, E, of the wheel and the discharge openings, g g, and with or without the valves, F, all arranged substantially as and for the purpose specified.

[This invention relates to an improved horizontal water-wheel, and consists in having the inner side of the watercase, which encompasses the wheel formed of india-rubber or other suitable or elastic material and arranged in such a manner with water passages and spherical rotating wheel buckets as to operate in a very advantageous manner.]

40,196.—Furnace for Sugar Evaporators.—S. B. Spaulding, Brandon, Vt.:

I claim the above-described iron frame in combination with the brick work and evaporating pans, substantlaily as set forth.

40,197.—Water Wheel.—Stephen Stenson, Beloit, Wis. Ante-dated Sept. 23, 1863 :

I claim the receiving buckets, A, in combination with the discharging buckets, B, when constructed and operating as herein set forth and described.

40,198.—Incendiary Shell.—C. W. Stafford, New York City :

I claim, first, The combination of the explosive chamber, A′, solid, central core, a2, annular incendiary chamber, C, and casing, B, arranged and operating in manner substantially as and for the purposes set forth.

Second, The combination with the shell, A, and detachable casing, B, of the skeleton bearing, H I J, constructed as described and employed to temporarily secure the forward end of the casing, B, and support and guide the shell within the bore.

Third, The combination with the shell, A, and casing, B, of the sabot, E, adapted and employed as described, to temporarily secure the rear end of the casing and support and guide the rear end of the shell within the bore.

Fourth, The concave expansible packing disk, G, formed at its periphery with two or more divided flanges, g g, and undivided toward the center.

Fifth, The shoulders, b′, in the described combination with the bearing, H I J, constructed and operating as and for the purposes described.

[This is a sub-caliber shell, adapted to carry both a bursting charge and a mass of incendiary matter into an opposing structure. When the explosion has produced its effect, the incendiary matter is ignited and completes the work of destruction.]

40,199.—Railroad Car Ventilator.—A. B. Spencer, Rochester, N. Y. :

I claim the swinging partition, E, arranged and acting in combination with the other parts of the double ventilator, so that the same ventilator will go in either direction, and perform the double function of admitting the purified air and discharging the foul air equally well either way and automatically, while the draft of ventilation is regulated and made nearly uniform thereby, substantially as herein specified.

I also claim the distributing plate, F, arranged and operating in combination with the swinging partition, E, substantially as and for the purpose herein set forth.

I also claim the ribs, c c, arranged upon the bottoms of the tanks, C C, longitudinal with the car, when there are communicating spaces, i i, alternately at the ends of adjacent ribs, for the purposes set forth; and, in combination therewith, I claim the jutting edges, b b, over the sides of the tanks, operating as specified.

I also claim the arrangement and combination of the catch bars, I I, levers, J J I, and connecting rods or links, k k m m, for regulating the valves or dampers, D D, as specified.

40,200.—Apparatus for cooling Beer and other Liquids.—Henry Steubing, New York City :

I claim the apparatus substantially as described.

0,201.—Cooking Stove.—John Van, Cincinnati, Ohio :

First, In the described combination with the grate, A A′, I claim the broiling and roasting chambers, B b, having in its floor a drop charcoal grate, C, the whole being arranged and operating substantially in the manner and for the purposes set forth.

Second, Constructing the top and boiler plates of a cooking stove with loosely fitting marginal flanges and grooves, T U V′, for the objects explained.

40,202.—Corn Planter.—J. W. Vandiver, Shelbina, Mo.:

I claim, first, Constructing the frame, A, so that the longitudinal beams thereof shall form scrapers for the hinged coverer shares, g, in the manner described.

Second, The combination of the hinged coverers, g, with the levers, l and m, when arranged as described, so that a person riding upon the rear part of the frame is enabled to raise or lower the coverers on both sides of the machine independent of one another and of the runners, in the manner specified.

Third, The forked bars or valves, d, pivoted within the seed-conducting tubes, F, and connected with the seed-distributing slides, a, in combination with the metal strips or tongues, e, attached on opposite sides and below the valve to the inner sides of the conducting tubes, F, substantially as and for the purposes set forth.

Fourth, Fitting a rim or tire to the wheels of a corn planter in sections, so that it can be put on or taken off according as a flat or concave tread is needed to adapt the machine for planting in sod or old ground, in the manner and for the purposes specified.

Fifth, The detachable sod cutters, N, attached by means of bolts, o p, to the runner, C, in combination with the same and the wooden strips, r, in the seed-conducting tube, F, in the manner and for the purpose specified.

40,203.—Tap for cutting Screw Threads.—C. C. Walworth, of Boston, Mass.:

I claim the tap constructed and operating substantially as described.

40,204.—Condenser for Steam Engines.—G. J. Washburn, Worcester, Mass. :

I claim, first, The use, in connection with a steam engine of any form, of an air-tight surface condensing tank, S, surrounded wholly or in part by a water chamber, A, and placed so high above the outlet of the exit pipe that the condensed water will escape by its own gravity, substantially as explained.

Second, The use of a siphon to convey condensing water to the water chamber, A, of a surface-condensing tank thus placed.

Third, A siphon having as a part of itself a surface-condensing tank, kept cold by the passage of water through the siphon, and kept from becoming full of water of condensation by its own elevation above the reservoir or hot well, H′, substantially as set forth.

0,205.—Breech-loading Ordnance.—Geo. J. Washburn, Worcester, Mass. :

I claim so applying a system of levers or other equivalent mechanical devices in combination with the breech of a breech-loading or chamber-loading piece of ordnance or other fire-arm, that the pressure of the explosion acting upon such levers shall tend to close the point between the breech and barrel, substantially as described.

[By this ingenious contrivance the force of the explosion is made to effectually close the joint between the movable breech and the barrel.]

40,206.—Method of regulating the Supply of Water in Steam Boilers. G. B. Wright, Elmira, N. Y. Ante-dated Oct. 1, 1861 :

I claim the combination of the electro-magnetic helix with steam boiler force pumps, or their appurtenances, the helices being connected by conductors to the boiler or its appurtenances, in such manner that the galvanic circuit is broken or completed by the rise and fall of floats or valves attached to the boiler or its appurtenances, thus regulating the supply in accordance with the demands of the boiler, as herein described, using for that purpose the aforesaid arrangement, or any other substantially the same, and which will produce the intended effect.

40,207.—Charcoal Furnace.—W. S. Wright, of St. Louis, Mo. :

I claim, first, A charcoal furnace of elongated form and with a flaring mouth, the flare being both in a lateral and longitudinal direction, and continuations of the curves of the base portion of the furnace—all in the manner and for the purpose described.

Second, An elliptical charcoal furnace provided with front and end draughts, b c c, substantially as and for the purpose set forth.

Third, An elongated flaring charcoal furnace constructed with end draughts, c c, substantially as and for the purpose set forth.

40,208.—Portable Stool.—O. D. Abbott (assignor to A. Gardiner), Chelsea, Mass.:

I claim combining folding arms, which, in connection with bands, form a back, with the folding legs of a portable stool, substantially in the manner and for the purpose as above set forth.

40,209.—Presser-foot of Sewing Machines.—James Bolton, Chicago, Ill., assignor to Singer Manufacturing Company :

I claim the combination of the legs of the frame of a presser-foot, which are grooved to hold a removable foot-plate, with the stem thereof, by means of upright connections, so that the junction of the two sides of the frame, is above the level of the foot plate, substantially as set forth.

I also claim the combination of the first part of my invention with an adjusting screw, substantially as set forth.

40,210.—Folding Arm-chair.—H. G. Golightly and C. S. Twitchell (assignors to English & Mersick), New Haven, Conn. :

We claim the combination of the standards, C C, when attached to the legs, a a, below the seat, with the solid arms, A-A, with the upper slat of the back immovably attached to them, when the whole is constructed and fitted for use and folding, substantially as herein described.

40,211.—Skate Fastening.—James Hewett (assignor to himself and Thomas Elliott), Clinton Mass.:

I claim the curved wire or rod, A, fitted in the lug or projection, a, of the strap, B, in combination with the swinging heel bearing, D, attached to the lug or projection, a, and the bars, i i, fitted on the ends of the wire or rod, A, all being arranged substantially as and for the purpose herein set forth.

[This invention consists in a clamp for securing the skate to the end of the boot or shoe, the parts being so arranged that the skate in being adjusted or secured to the boot or shoe is made to serve as a lever, so as to render the adjustment extremely easy, the clamp at the same time firmly securing the skate to the heel, and in such a manner as to cause the heel to be grasped firmer as it is raised up from the ice in skating, and at the same time tending to prevent the skate moving laterally before the toe strap is fastened over the front part of the boot or shoe.]

40,212.—Sewing Machine.—Luther and Stoughton B. Holden (assignors to themselves, J. C. Seely and L. L. Holden), Woburn, Mass.:

We claim, first, The tack-drawing device, consisting of an elastic fork, applied in combination with a sewing machine, and operated by a wedge, E, or its equivalent, substantially as and for the purpose herein specified.

Second, The arched needle-die, B, standing above the bed-plate of the sewing machine, and slanting transversely, substantially as and for the purpose herein specified.

Third, The combination of the grooved, toothed or roughened surface, f, of the presser, G, and the corresponding grooved, toothed or roughened surface, g, of the needle-die, B, substantially as and for the purpose herein specified.

40,213.—Constructing Field Fortifications.—Pierre Jamain, Bordeaux, France, assignor to himself and J. M. Trippe, Orange, N. J.:

I claim the employment, in the construction of field fortifications and embankments, of portable voussoirs of wood, or other material, made to fold up, substantially as herein described.

40,214.—Cheese Turning Apparatus.—Allison Mears, Brashear, N. J., assignor to himself and Abiel Edell, Oneidale, N. J.:

I claim the tongs, G, in combination with the pivoted jaws, J J, and washers, I I, constructed and operating as and for the purposes set forth.

Second, I claim, in combination with the aforesaid tongs and pivoted jaws, the pedestal, A, post or upright, B, lever, C, ring and staple, D E, chains, F F, and strap, K, the whole being arranged and operated substantially as herein specified.

[The object of this invention is to turn a cheese with less danger of injuring it, and with greater ease to the operator than is possible by hand.]

40,215.—Horse-Shoe.—Emanuel Pleyel, Dallas Co., Iowa, assignor to himself and Albert Zeigler, Buffalo, N. Y. :

I claim the six-sided calks, L and N, with their double-shouldered screws, E, constructed and combined as herein described and for the purposes set forth.

40,216.—Cutter-head for Apple-parers.—E. L. Pratt, (assignor to Geo. R. Carter), Boston, Mass.:

I claim hanging the cutter-head to the arm, A, substantially as described, in combination with applying to it the spring, b, in the manner and for the purpose as above set forth.

40,217.—Preparing Woody Fiber for Paper Stock.—G. S. Sellers (assignor to himself and P. M. Price), Hardin Co., Ill.:

I claim the separating and disintegrating of woody fiber for paper making, by pressure in the line or nearly so of the fiber, substantially in the manner above described.

40,218.—Car Spring.—Richard Vose, New York City, assignor to C. S. S. Lenox, Newark, N. J.:

I claim the combination of one or more straight metallic springs, B B, with the peculiarly-formed, interposed, distributing plates, C C, and central compensating springs, D D, substantially in the manner and for the purpose herein set forth.

When straight metallic springs, B B, are combined with interposed outwardly curved distributing plates, C C, and compensating springs, D D, substantially as herein described, I claim combining the same with an arched bearing-plate, E, and end or bed-plate, A, substantially in the manner and for the purpose herein set forth.

40,219.—Grain Dryer.—Thomas Wallace (assignor to himself, Henry A. Ballentine and E. F. Lawrence), Chicago, Ill.:

I claim, in a grain-drying apparatus, the combination and arrangement of a series of conveyors, situated one above the other in separate air-tight copartments, whereby the grain is carried back and forth through a kiln, over a series of perforated inclined surfaces in a zigzag course, when a separate hot-air blast is admitted into each of said copartments, arranged and operating as and for the purposes herein described.

Second, I claim the combination and arrangement of the perforated troughs, E, the revolving shaft, E, provided with the spiral, b, and stirrers, c, and the spur-wheels, B, miter-wheels, i k, shaft, I, miter-wheels, e f, and shaft, C, arranged and operating substantially as delineated and described.

Third, I claim the combination of the reciprocally-arranged conveyors, F F, provided with the spiral, b, and stirrers, c, with the air-tight chambers, 1 2 3 4 5 constructed and operated as herein shown and specified.

40,220.—Journal Bearing.—Richard Yielding, (assignor to himself and H. H. Lock), Ypsilanti, Mich.:

I claim, first, the boxes, D D′, constructed and employed as described, to inclose and afford bearings in the inner walls of the oil-tight reservoirs for the anti-friction wheels, B B′, and provide means for attaching the auxiliary axles in any desired positions.

Second, The oil-tight reservoirs, F F, employed in the manner described, within the boxes, D D′, to afford constant lubrication to the pivots.

[This improvement in anti-friction journal bearings is applicable o all kinds of wheel vehicles and stationary machinery. It is provided with oil reservoirs, by which the rollers are economically and effectually lubricated.]

40,221.—Brick Machine.—Cyrus Chambers, Jr., Philadelphia, Pa. Ante-dated Sept. 2, 1863.:

I claim, first, Arranging in the same horizontal line with each other the tempering-chamber, impelling-screw and forming-die, so as to secure directness of action and simplicity of gearing, as described.

Second, Imparting to the tempering chamber and screw-case the tapering form described and shown, so as to gradually compress the clay and exclude the air in its passage to the forming-die, as specified.

Third, So constructing a screw that the clay may enter it at an annular space, and be delivered in a solid mass opposite its end, and at the center of the screw, substantially in the manner and for the purpose described.

Fourth, Preventing the clay from revolving with the screw in the screw-case, by roughening or checkering the interior surface of that case, substantially as described.

Fifth, The combination of a knife with a fly-wheel, for the purpose of severing a bar of clay into proper lengths for bricks, the velocity of said fly-wheel being regulated or controlled by that of the bar of clay.

Sixth, The combination of the apron, a, with the fly-wheel, Y, and knife, k, all arranged for conjoint operation, substantially in the manner and for the purpose specified.

Seventh, Propelling the cut-off device by means of a friction clutch, and regulating the power of said clutch by means of a yielding pressure.

Eighth, The yielding severing knife, k, constructed and operating substantially as set forth.

Ninth, Supporting the clay at the line of severance by a movable frame or supporting stirrup-guide, L′, through which the knife, K, is guided, as and for the purpose stated.

Tenth, Moving the knife and the supporting guide, L, together, during the severance of the bars at the same speed with which the bar of clay advances, for the purpose of cutting off the brick at right angles to the course of the bar as directed.

Eleventh, Driving the off-bearing apron, a′, at greater speed than that of the bar of clay, for the purpose of separating the brick by a sufficient interval, as described.

Twelfth, Giving to the conical impelling screw a gradual increasing depth or thread, to secure uniformity between the amount of clay received by the base of the screw and that delivered at its point, as set forth.

RE-ISSUES.

1,548.—Lamp.—James Adair, Pittsburgh, Pa. Patented July 31, 1860:

I claim, first, Constructing a hood or cap, L, having an orifice through its upper end, in such manner that the flame of the lamp will be contracted in thickness at the center, and expanded beyond this point, and so that the ascension thereof will be such as sufficiently to allow the particles of carbon to become so lightly heated as to unite rapidly with the oxygen of the air, which is supplied beneath said cap, substantially as described.

Second, The hood or cap, L, provided with air entrances beneath it, and also with a slot or opening, Z, in its top, having its central part or space narrower than the space at its ends, substantially as described.

Third, Making the deflecting and flame-retarding lips of cap, L, adjustable, substantially as described.

Fourth, The gas tube or burner, H, having an elliptical and centrally-depressed orifice, side openings, k k, ring or band, h, and distended connecting arms or strips, j j, substantially as described.

Fifth, The wire gage thimbie, G, arranged within the space, in the lower part of the burner, substantially as described.

Sixth, The central wick tube, g, in combination with the valve, b, adjustable wick tube, E, and the chamber beneath this tube, substantially as described, for the purpose of causing cold oil from the reservoir, to flow over the upper part of the wick, as set forth.

Seventh, Condensing the gas evolved after the light is extinguished, and thus preventing this gas from escaping from the lamp, by means substantially as described.

1,549.—Shade for Billiard Tables.—David Conlan, New York City. Patented June 7, 1859:

I claim, first, A shade for billiard tables, having two reflecting parts, B′ B″, and otherwise made as herein shown and described.

Second, Determining the inclination of the sides of reflector, B′, from the edges of the table, substantially as and for the purpose set forth.

[The object of this invention is to adapt the shades used over the lights of billiard tables to their particular position at points which are situated at a certain distance from a vertical line drawn through the center of the table, and to arrange said shades in such a manner that all the rays from the lights are concentrated upon the table, the space beyond being left in comparative darkness.]

1,550.—Shingle Machine.—J. R. Hall, Brunswick, Maine : Patented June 22, 1858 :

I claim, first, The combination of rods, q q′, with their pins, 7′ 7, thimbles, 5′ 5″, with their slots, 6 and 8, sleeve, 2 2′, and pawls, 1′ 1″, in combination with the notched wheels, 4 4′, and rolls, T T′, for feeding the bolt to the saw.

Second, I claim the arrangement of the frame, U, in relation to the other parts, for fastening and holding the bolt while being sawn.

Third, I claim the hinged fender, E, with its cord and spring, Z.

Fourth, I claim the combination of springs, m′ and n′, clutch lever, j, lever, R, bar, n, with its catch, S′, cams, Q′ and P, and pin, P′, in combination with the pulleys, I′ I″ and h h′, for giving motion to the carriage, Y, all of which operate substantially as and for the purpose set forth.

Fifth, I claim broadly, the feed rollers, T T′, in connection with the ratchet wheels, 4 4′, with unequal spaces between the teeth, for the purpose of moving the bolt unequal distances at the respective ends, for the purpose specified.

1,551.—Steam Coiled Hoop.—James Tomlinson and Andrew Gage (assignees of James Tomlinson, aforesaid), Wellington Square, Canada. Patented May 26, 1863:

I claim a sawn or cut hoop or hoop-splint, prepared in coiled form for cooper's use, in any manner, substantially as set forth.

DESIGNS.

1,821.—Parlor Stove.—A. C. Barstow, Providence, R. I.

1,822.—Gas Cooking Stove.—William Craig, Brooklyn, N. Y.

1,823.—Parlor Stove.—J. D. Flansburg and John Gardiner, (assignors to Chase, Sharp and Thompson), Philadelphia, Pa.:

1,824, 1,825, 1,826, 1,827.—Four Patents for Blind Fastening.—H. W. Hensel, Philadelphia, Pa.

1,828.—Furnace Stove.—G. Smith and H. Brown (assignors to Abbott and Noble), Philadelphia, Pa.

1,829.—Cooking Stove.—G. Smith and H. Brown (assignors to Abbott and Noble), Philadelphia, Pa.

EXTENSION.

Burring Cylinders.—C. G. Sargent, Lowell, Mass.:

I claim a cylinder for burring, opening, picking, carding, &c., cotton and wool, in which the burring or working surface is formed by alternate rows of sharp-pointed teeth, and thin metallic edges either set spirally or straight across the cylinder, whether said teeth and edges are constructed and shaped as above set forth, or in any other way substantially similar thereto; it being distinctly understood that my claim is to the burring or working surface produced as above suggested.

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The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model of drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F nd Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical productions he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can ofte be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from **$30** to **$15**. Other changes in the sees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of t United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventi ns by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents or new inventions in the United States and all foreign countries has en conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency y the inventors throughout the country we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms!

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row, New York.

Notes and Queries

C. A. P., of N. Y.—The engines you mention are not adapted for sawing wood. We never heard of any machine sold for $10 to do the family sawing, and we think that the manufacturer's profits at that price would be quite microscopic.

C. H. C., of Conn.—Take copper rivets and rivet your elevators to your belt.

J. J., of N. Y.—You are a wonderfully acute critic. Filing a spring imparts elasticity to it, inasmuch as it reduces the thickness of metal. A piece of steel ¼ of an inch thick, filed down to ⅛th of an inch, is more elastic than it was at first; but properly speaking it is the temper that imparts the virtue in question. We advise you to try your talent in a little higher sphere next time.

F. H. S., of Conn.—We answered your letter according to the nature of the request. You wished to know how to remove scale from boiler tubes, and we supposed you meant the usual saline deposit. You say, however, that you desire to remove soot, or scale resulting from combustion burned on to the inside of the flue. For this purpose there are wire brushes made in great numbers, and sold by Thomas Prosser, 28 Platt street, this city. The sketch you inclose is good and will do good service. Why have you not tried it? It is patentable, we think, and you should take measures to secure it.

J. McB., of Pa.—It is customary to measure the diameter of valves through the center of the seat, for the reason that, in theory, valves leak to that point, and, consequently, there is so much added to the diameter. This is only a theory, and may not be true in every case.

E. L. G., of Conn., asks—If I own the right to make and sell a patented article in this town, can I sell the article to be used in an adjoining town and the right of which is owned by another person? Ans.—Yes, you can sell, in your town, to any one who chooses to buy. But the purchaser has no right to use the article in the adjoining town.

D. A., of Mo.—Water cannot be raised by suction higher than 32 feet above its surface in a well or river. The pressure of the atmosphere will only sustain a column of water of about 32 feet vertical hight.

H. W., of N. J.—Iron and copper pyrites are now extensively employed in England in place of sulphur, for the manufacture of sulphuric acid. Metallic iron and copper are extracted with profit from the ash. We are not aware that pyrites are used in any of the American chemical works for making sulphuric acid. As very large quantities of this acid are required for refining petroleum, attention should be directed to its manufacture from native pyrites, or those deposits of gypsum which contain large quantities of it.

B. P. R., of Vt.—The resistance of the atmosphere to the passage of an elongated rifle bolt is in proportion to the area of the largest part. Whitworth claims that the form of his bolt, both ends pointed, affords the least atmospheric resistance, as in its passage the air closes in on the tapering rear and accelarates, theoretically, its flight.

A. W., of Mass.—The price of aluminum, to which you refer, is that at which it was sold in London and Paris. All that is used here is imported.

W. D. S., of Ohio.—Super-sulphate of lime may be manufactured by dissolving bones in muriatic acid, just as well as by the common mode of employing sulphuric acid to decompose them.

P. L., of Maine.—We have not visited any of the English blockade-runners, and cannot give you a description of their engines; they are doubtless very similar to those of all other steamships.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Oct. 7, to Wednesday, Oct. 14, 1863 :—

M. Y. McK., of N. J., $25; D. G. G., of N. Y., $25; C. B. N., of N. Y., $25; A. & McG., of N. Y., $25; C. J. Van O., of N. Y., $25; J. L. G., of N. Y., $25; J. H. S., of N. Y., $12; M. & H., of Ill, $20; I. B., of N. J., $16; H. R. W., of Wis., $45; C. E. B., of N. Y., $16; T. B., of N. J., $45; W. G. P., of Del., $20; I. H., of Wis., $20; E. W., of Mich., $20; J. H. K., of La., $41; V. & M., of N. Y., $16; E. J. F., of Ill., $20; A. M. & J. D. B., of Mich., $20; J. S. C., of Ill. $20; J. J. L., of N. Y., $16; T. R. T., of N. Y., $20; E. S. H., of N Y., $20; J. D., of N. J., 16; J. G. R., of Colorado, $20; A. C. T., of Ill., $25; F. J. R., of Conn., $16; J. B. McC., of Mo., $16; C. S., of U. S. A., $20; A. Van G., of N. Y., $16; F. D. D., of Ohio, $31; T. & J., of N. Y, $25.; J. S. F., of N. T., $40; J. L. C., of Iowa, $25; J. D., of Ill., $12; T. K. A., of Ill., $16; G. W. P., of N. Y., $25; W. H., of Wis., $25; R. J. S., of N. Y., $25; E. C., of Mass., $16; D. L., of C. W., $16; J. A., of Pa., $16; S. E. T., of Wis., $16; J. C., of Iowa, $15; J. W. Van De V., of Mich., $25; L. D. B., of Ind., $30; J. P., of Iowa., $16; R. L. S., of Mich., $25; G. D. H., of Ill., $15; F. H. M., of Mass., $15; J. J. E., of N. Y., $270; J. W. F., of Pa., $10; B. & H., of Conn., $16; D. D. & Co., of Wis., $30; L. W. M., of N. Y., $16; J. M. G., of Ill., $16; T. & Bro, of Wis., $15; J. C. C., of Ill., $15; E. E. C., of Ill., $15; E. J. S., of Md., $20; A. P. B., of N. Y., $16; C. M., of N. Y., $25; J. A., of N. Y., $25; V. G., of N. Y., $20; C. G. W., of Vt., $45; J. C., of N. Y., $20; C. B. D., of Ind., $20; W. R., of England, $44; H. & P., of Cal., $30; D. W. S., of Conn., $25; W. S., of Ill., $25; G. H. D., of N. Y., $45; S. & P., of Ill., $25; H. G. D., of Ky., $26; J. S. G., of N. Y., $16.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgement by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Wednesday, Oct. 7, to Wednesday, Oct. 14, 1863 :—

M. V. McK., of N. J.; D. G. G., of N. Y; C. B. N., of N. Y.; A. & McG., of N. Y.; C. J. Van O., of N. Y.; J. L. G., of N. Y.; J. H. S., of N. Y.; C. M., of N. Y.; J. A., of N. Y.; W. R., of England; E. J. S., of Md.; J. D., of Ill.; W. A. T., of Va.; R. L. S., of Mich.; J. L. C., of Iowa; G. W. P., of N. Y.; J. W. Van De V., of Mich.; A. C. T., of Ill.; T. & J., of N. Y.; R. J. S., of N. Y.; W. H., of Ill.; G. H. D., of N. Y.; W. S., of Ill.; D. D. and others of Wis; D. W. S., of Conn.; H. & P., of Cal.; S. & P., of Ill.; H. G. D., of Ky.; J. R. of Ind.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of our reception of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO., No. 37 Park-row, New York.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement hey may deem objectionable.

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ORDNANCE OFFICE.

WAR DEPARTMENT,
Washington, Oct. 2, 1863.

Sealed proposals will be received at this office until the 30th day of October next, for banding and bushing the 42-pounder guns, at the forts and arsenals of the United States in the Atlantic States, amounting in number to 200, more or less.

The guns will be delivered at, and removed from, the establishment where the work is to be done at the cost of the United States.

Proposals for those on the Pacific Coast—about 50 in number—will be received until the 10th of December next; and in the case of these, the guns will be delivered at San Francisco or its vicinity.

The guns are to be turned down to a true cylinder for the length of twenty-seven inches from the rear of the base ring, prepared to take a band of the best wrought-iron, the interior diameter of which will be twenty inches, and its thickness three inches.

The vent is to be bushed with a new bush of pure ingot copper, one inch in diameter and about nine and a half inches long, and bored with a vent of two-tenths of an inch.

Drawings of the gun in its original form and with the band put on can be seen at this office, at the Watertown Arsenal, Mass.; at the Watervliet Arsenal; and at the New York Agency, No. 45 Worth street, city of New York; at the Arsenal at Bridesburg, Pa.; and at Allegheny Arsenal, Pittsburg, Pa.; at the Fort Monroe Arsenal, Va.; St. Louis Arsenal, Mo.; and Benicia Arsenal, Cal.

The work is to be done to the entire satisfaction of the officer who will be appointed to superintend it; and payment will be made in full for each gun upon his certificate of inspection and receipt.

Proposals will state the price per gun for the whole operation; describe in detail the manner in which it is proposed to put on the band; the number they will band per month; and the time which will be required to do the whole work. The method and the time required for doing the work, as well as the price, will be important elements in considering the bids and awarding the contract.

No bids will be considered from any parties but such as are actually engaged in the manufacture of iron and heavy machinery, and who are, in the opinion of this Department, fully prepared to execute the work. In the case of parties not known to this Department, evidence to the foregoing effect must accompany the proposal.

Bond, with satisfactory sureties, to the amount of fifty per cent. of the bid, will be required for the fulfilment of the contract; and the Government reserves the right to reject any or all bids, if deemed unsatisfactory.

Proposals will be endorsed "Proposals for Banding 42-Pounders," and will be addressed to Brigadier-General George D. Ramsay, Chief of Ordnance, Washington City. GEO. D. RAMSAY,
16 3 Brigadier-General, Chief of Ordnance.

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Improved Artificial Leg.

The inventor of the artificial leg herewith illustrated, has worn a full length one for the past eighteen years; he has tried various kinds on other principles, and consequently claims to be pretty thoroughly acquainted with their deficiencies when brought into actual use. His object has been to imitate nature more closely than has yet been done, and produce a leg embracing all the advantages it is possible to embody in an artificial limb. How far he has succeeded, he leaves those interested to judge.

Of the annexed engravings, Fig. 1, is an external view of the finished limb, Fig. 2, shows the internal arrangement. A, is the thigh piece, B, the leg piece, and F, the foot. The bearing at the knee is formed by the two parts, A B, coming together end to end. A similar bearing is formed at the ankle by projections upon the leg piece, B, resting upon shoulders on the foot, F. The parts are connected at the knee, by the pins passing through the upright bar, *d*, and oval side-pieces which form the lateral contour of the knee. The foot is attached to the leg by the cord, *u*. A knee-strap is formed by the cross-bars, *e e f f*, arrested in their motion by the upright bar, *d*. Straps crossing each other through the knee and ankle joints, prevent the parts from slipping; while to the side pieces before mentioned (not shown in the engraving), the knee-pan, K, is attached. The knee and ankle joints are both operated by one cord, L, attached to the instep of the foot, passing up through the leg, as shown by the dotted line, and attaching at some point above the leg to the supporting strap, S. It will be seen that the moment the leg begins to bend, as in the act of walking, a strain comes upon the cord, L, which being connected to the foot, lifts the toes, and drawing over the knee joint, acts as a most prompt and effective knee-spring during the forward movement of the leg. The motion of the foot is limited by the tenon of the leg-piece, B, striking at diagonal points in the mortise of the foot, F. The leg is stuffed to accurately resemble the shape of the natural limb, and covered with flesh-colored enameled leather. Very flexible portions are inserted, as shown, at the knee and ankle, allowing free play to those joints.

Fig. 1.

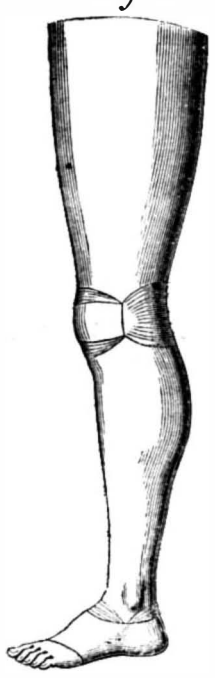


Fig. 2.

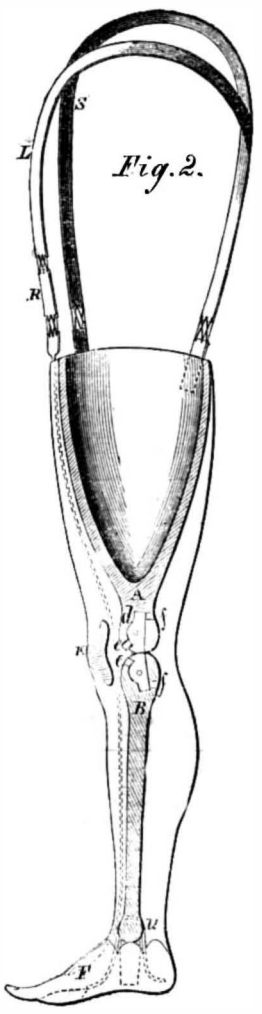
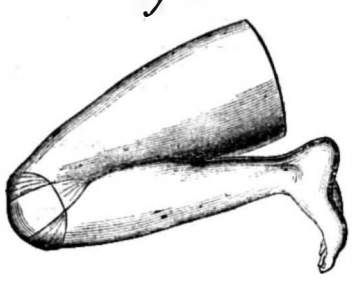


Fig. 3.



SMITH'S ARTIFICIAL LEG.

The advantages claimed for this leg are as follows: The knee joint will bend back to the full extent of the natural limb, as shown in Fig. 3, thus relieving the wearer from the cramped and uncomfortable positions which constantly occur with a leg that will bend up only half way; and also that it enables the wearer to assume any position that he could with the natural limb. All who wear artificial legs will at once appreciate this. A solid and continuous support of wood is obtained from the body to the ground; dispensing with the use of bolts, and forming the most simple and sure bearings that can be obtained. All springs in the leg are dispensed with; thus avoiding the necessity of frequent repairs. A distinct spring in the ankle joint in other legs, keeps the toes elevated when the wearer is sitting, and the foot is relieved from pressure; which is an awkward position. With this leg, when the person is seated, the cord, L, is relaxed, allowing the toes to drop into their natural position. Legs which have a distinct spring attached to the knee joint, necessarily tax that spring to its utmost, when the leg is bent as in the sitting posture; which is unnatural and unphilosophical, and being in this position so great a portion of the time as it must necessarily be, the spring will eventually lose its elasticity, and become inoperative. With this leg, when a person is in the sitting posture, the cord, L, is relaxed, and the elastic, R, relieved from all tension whatever; no strain coming upon it except in the act of walking, which is the only time when the action of any spring is required. Being thus relieved except when walking, it is always ready to act at that time, and there can scarcely be any limit to its durability. This elastic which operates both the knee and ankle joints, being inserted, not in, but above the leg, its tension can be regulated by the wearer with the utmost convenience, without even removing the limb. In addition to the foregoing specific points, this leg is claimed to be superior to all others, in lightness, simplicity of construction, ease of repair if damaged by accident, absence of friction, and consequent durability. The inventor bases these claims on his own experience with other limbs, and one year's wear and thorough trial of this. Letters patent for this invention were granted on July 28, 1863, to Uriah Smith, Battle Creek, Mich.; further information respecting the purchase of limbs, or territorial rights, can be had by addressing him at that place.

THE MOON.—Professor Phillips, of England, has succeeded in obtaining drawings of the moon seen through a new telescope with a 6-inch object glass. They exhibit many new and striking features, showing a volcanic action of which we of this world have no conception. What would we think if our whole continent was a collection of craters, with hills rising out of their midst and divided by radiating ravines of awful depth? The only approach to any such scenery in our world is to be found in the Cordilleras of our gold regions.

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